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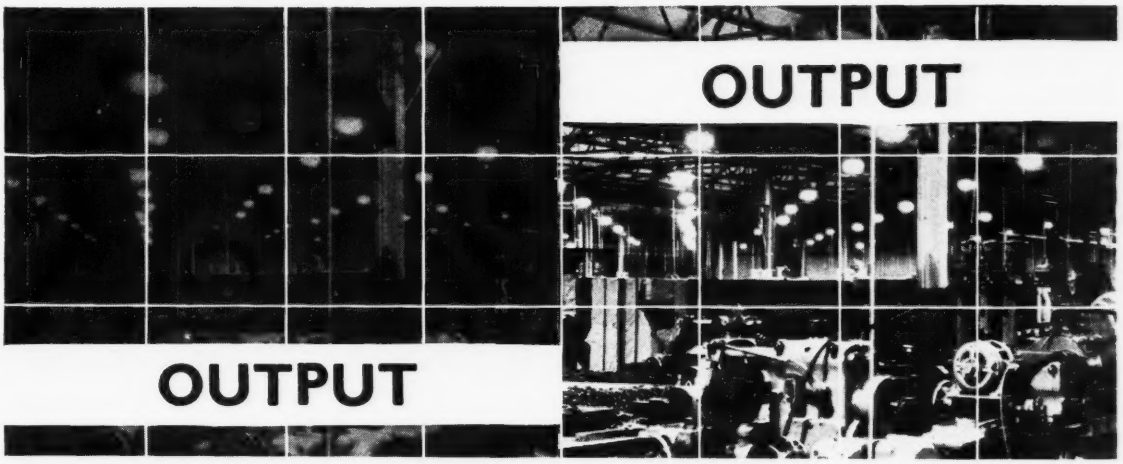

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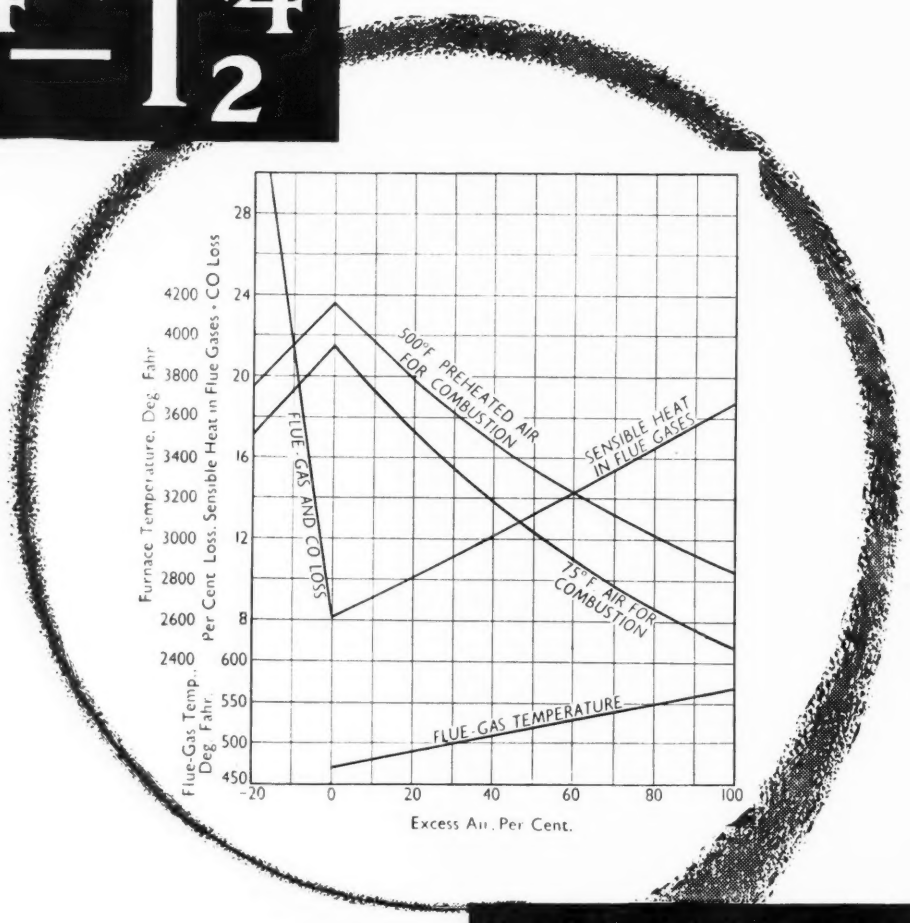
Furnace Temperature, Deg. Fahr.
Per Cent Loss. Sensible Heat in Flue Gases + CO Loss
Flue-Gas Temp., Deg. Fahr.
Excess Air, Per Cent.
500°F. PREHEATED AIR FOR COMBUSTION
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75°F. AIR FOR COMBUSTION
FLUE-GAS AND CO LOSS
FLUE-GAS TEMPERATURE

Curves showing relationship between excess air, theoretical temperatures of combustion of coal, flue gas temperatures and sensible heat in flue gases. From "Limiting Factors in Reducing Excess Air in Boiler Furnaces" by E. G. Bailey.

"THE flue gas temperature curve is taken from actual data, while the other curves of the figure are theoretical. It is seen that an increase in flue gas temperature occurs with an increase in percentage of excess air due to the higher velocity of the gases through the boiler and the lower rate of heat transfer by radiation when the initial temperatures are lower. It is noted that there is an increase in theoretical temperature of about 200°F. for each 10% reduction in excess air. Therefore, the percentage of excess air is a very important factor in controlling furnace temperatures for a given set of furnace conditions."

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THE ELECTRICAL REVIEW

Volume CXXVIII — No. 3313

Friday, May 23, 1941

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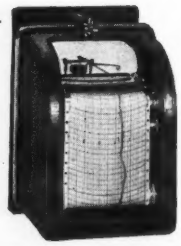

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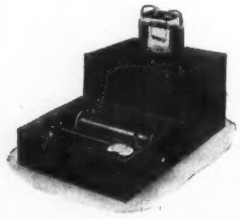

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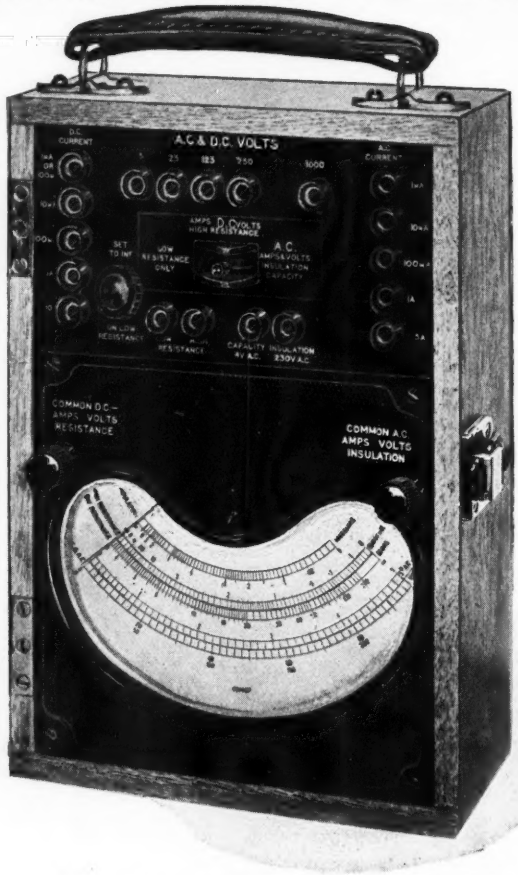

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THE
ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXVIII. No. 3313 MAY 23, 1941 Price SIXPENCE

Future Power Production

Efficiency and Some Adverse Factors

GIVEN a determination on the part of electrical engineers to secure all the load feasible and the non-materialisation of further deterrent factors outside their control, there would appear no real justification for anxiety about the prospects of electricity supply after the cessation of hostilities. One of the chief conditions of success, however, is that the efforts of consumers' departments shall receive the backing of power station designers and operators to an even greater degree, if possible, than before.

A substantial proportion of the load that awaits connection can be secured only if the price is low enough to compete with private generation or with other forms of energy. This is certainly not likely to be more easy in the future than it has been in the past. Fuel costs, always the dominating feature in generation, are hardly likely to return for a long time to the immediately pre-war level. Even then they had advanced in the three preceding years to heights that were more than enough to wipe out the economies that had been obtained due to grid working.

Choice of Coal

Price is not the only difficulty. Power station owners have of late been restricted in their choice of fuel, which used to be determined by local conditions, whereas to the authorities who have more recently decided such matters all too often coal is just coal, without reference to the kind suitable in individual instances. We are not, of course, referring to war conditions, in which other considerations have to take first place, but to the state of affairs that prevailed previously and the return of which after the war must be taken into account. Other examples of obstacles to electrical development are to be found in the penalisation of public supply undertakings, as compared with other industrial concerns, with regard to differential charges for coal and their liability to local rates.

On the other hand, there is the distinct asset that the generating plant which will produce the bulk of the output is relatively new, as will be evident from the large increase in capacity sanctioned by the Electricity Commissioners during the past few years. One of the great advantages of a rapidly growing industry, such as ours, is that the continual need to extend its productive resources enables it to incorporate without loss of time the most recent technical advances. Even the irregular load curve has its merits, as the newer units can be run to supply most of the output, the less efficient sets being relegated to peak-load service. It should be borne in mind, however, that the tendency of the load curve to flatten makes the thermal efficiency of the peak-load units a matter of growing importance.

A comprehensive summary of the age of generating equipment in the United States has been made recently by the Federal Power Commission, which shows that less than one-fifth of the steam generating capacity is more than twenty years old. As the *Electrical World* states in commenting upon the report, compared with almost any other industry that has been in existence for over half a century, that is almost a record for modern equipment.

Little Obsolescent Plant

The position in this country is probably even better, since growth of load has been more rapid owing to the leeway that has been made up. It is improbable that any of the 2 million kW installed in the 438 British power stations at the end of the last war contributed towards meeting the demand of 6.7 million kW in 1938 (the last published figure) which was dealt with by 159 stations (out of 172) under the direction of the Central Electricity Board. These stations generated more than 97 per cent. of the electricity supplied to consumers and fourteen of them were responsible for half of the national output, while only thirty were required to run for the whole year.

Much of the good work has been done by new plant on old sites, a good site not being subject to the laws of obsolescence. At one time the need to provide some 500 tons of condensing water for every ton of coal burned restricted the choice of new sites, but the position in this respect has been very materially bettered in recent years by the development of the concrete cooling tower.

It has been the general policy to take overall thermal efficiency as the criterion of merit for generating stations. While the results achieved in the past have justified this attitude, it seems reasonable to assume that it will be of still greater importance in the future. Published figures for 1938 showed that thermal efficiencies approaching 28 per cent. had been achieved by individual stations,

but over 30 per cent. was expected from new stations not yet included in the official returns. These operated with the more elevated steam conditions which furnish the key to any appreciable improvement likely to be obtained over present results.

Concentration and Taxation

ALTHOUGH at present the arrangements being made for the concentration of industry are of more or less academic interest to electrical concerns it is desirable to record the progress of these arrangements. It was announced in Parliament last week that the Chancellor of the Exchequer has agreed to make special provisions for taxation in industries which have been "concentrated." For income-tax and excess profits tax purposes the taking over of a business by a "nucleus" concern will not be treated as the closing down of the business and the setting up of a new one. Payments (except those of a capital nature) from a nucleus to an "absorbed" firm will be allowed as a deduction in computing the nucleus firm's profits and will be treated as a trading receipt of the displaced firm. Similar treatment will be accorded payments into and out of a central compensation fund. In computing liability to excess profits tax the capital represented by machinery and plant belonging to a displaced firm, which is temporarily out of use, will still be regarded as still employed in the business. Likewise income-tax allowances for wear and tear of machinery and plant will be continued as though it were in normal use. These concessions will help to mitigate the hard lot of firms who, through no fault of their own, are compelled to suspend their activities during the war period and will be of some effect in keeping them in existence ready for rapid revival after the war.

Evening Meetings

NOT the least of the drawbacks of the black-out has been the cessation of technical meetings in the evenings. In many cases papers have been available to read at home, but one misses the subtle emphasis laid by the author on his chief points and the interplay of intelligence in the subsequent discussions, both official and unofficial. It is good news, therefore, that the Institution of Electrical Engineers is to hold two informal meetings—the first on Monday next, when the President, Mr. J. R. Beard, will open a discussion on "Looking Forward." It may be expected that the interest shown in these events will be such as to suggest that further meetings during the light evenings would be acceptable to the membership.

"Reservation" of Students

IT is essential that in calling up men under the age of twenty due regard should be paid to the future of scientific and technical development which will be in the hands of such of these young men who are now being trained for the professions. To a large extent this is provided for in the Schedule of Reserved Occupations which stipulates that "reserved" students, in general, shall maintain satisfactory progress in their studies and join a training corps or a Civil Defence service. The Ministry of Labour and National Service advises all other students of the 1922 age group who desire to go to a university to present themselves to a Joint Recruiting Board, and to proceed to a university only if recommended to do so by the Board. Such students may undertake one of the specified scientific or technical courses; if they contemplate some other course they may, after enlistment in one of the fighting services, be placed to the reserve. Such students will (subject to emergencies) be allowed to complete one year of academic study, but renewal beyond that will be granted only for special reasons. Students taking the specified scientific or technical courses will receive such deferment as is necessary in the national interest. The Joint Recruiting Boards will recommend a University course for students of subjects other than the specified scientific or technical ones only if satisfied that men have more than average ability to profit by such a course, having regard either to intellectual ability or promise of capacity for leadership. No deferment will be granted to students proceeding to a university without recommendation from a Board.

Fortunate Employees

AN outstanding feature of the speech of Mr. G. Leslie Wates at last week's meeting of Johnson & Phillips, Ltd., was his reference to the generous treatment accorded to the company's employees. The directors have decided that all men in their employ who have had to join the Forces shall have their pay supplemented by an allowance from the company. Hitherto these payments have been made only to men who volunteered for service. Moreover the whole of the employees are to be given a special bonus in recognition of their work during the past year, often carried out under arduous conditions. The company has also established an emergency fund for the assistance of those who have sustained losses by enemy action. Mr. Wates welcomed the deferred relief from part of the Excess Profits Tax and said that they were not taking any immediate credit in the accounts in respect of the 20 per cent. which would ultimately be returned to them. It would remain an "unstated reserve" which would be brought into the accounts as and when it materialised.

Plant for New Zealand

DISCUSSING the possibilities of a power shortage and the need for keeping the Dominions' new electrical manufacturing industry going, the *New Zealand Electrical Journal* urges the adoption of a long-term view. It says that present indications (this was written in February) seemed to be that the winter, with all its seriousness, would not see any large diminution in the sale of electrical appliances in New Zealand. It concludes by stating that "the position for 1942 must, however, be borne in mind and if, in order that the schemes may be kept going and the market for goods kept open, recourse has to be made to the U.S.A. or Canada for generating apparatus, then such recourse must be taken and arrangements made for at least the more urgent parts of our requirements to come from those countries." This raises a serious matter for British electrical manufacturers who see not only orders for the lighter apparatus but also those for heavy plant passing from them. Urgent as are our war needs, special consideration should be given by the Board of Trade to this position with a view to counteracting the tendency for trade to drift away from this country, perhaps for ever.

Railways in London

IN a communication to the *Sunday Times* under the heading "Replanning London," Alderman A. Emil Davies "pleads earnestly" that steam trains shall be forbidden within the limits of the metropolitan area, as they are in New York and other cities of the United States. In addition to the consequent advantage of smoke reduction, he mentions the abolition of "enormous glass-roofed horrors" as termini and the setting free of the valuable sites on which they stand, presumably by putting the stations underground. The last was one of the more important of the claims made for railway electrification in the ELECTRICAL REVIEW by the late Sir Philip Dawson. It is to be hoped that its advocacy at the present opportune moment by the immediate past-chairman of the London County Council will lead to necessary action when the subject comes up for consideration.

Repulsion-start Induction Motors

Construction and Maintenance

By "Rotor"

The author briefly reviews the principles of single-phase motor design and discusses possible faults and their remedies

DESIGN presents greater difficulties in the case of single-phase than of three-phase induction motors, since a rotating field can be produced for the latter by a simple arrangement of stator windings so that the EMF in each phase reaches a maximum value in turn. The combined effect of this arrangement is equivalent to that of a single field of uniform strength rotating at a constant speed which is dependent upon the frequency of the supply and the number of poles for which the motor is wound.

A rotating field cannot be obtained by mere geometrical arrangement of windings in a single-phase motor. A simple stator winding

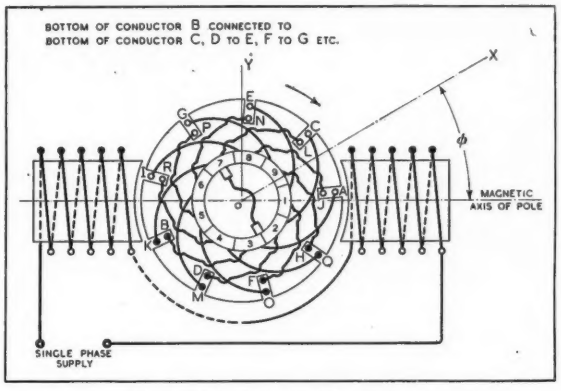


Fig. 1.—Simple repulsion motor

connected to the supply creates a pulsating field which acts along the axis of the poles, the field strength increasing, decreasing, reversing and so on. The comparison between a three-phase and a single-phase winding is similar to that between a turbine and a reciprocating steam engine with crank on dead centre.

Various means have been adopted to make a single-phase motor self-starting, such as by creating an auxiliary magnetic field which does not reach maximum strength at the same time as the main field. For drives such as small fans, a shielded-pole machine may be used. In this a section of each pole face is surrounded by a short-circuited band of copper, which acts as the secondary winding of a transformer, of which the primary is the stator winding, delaying the cycle of the magnetic field through the encircled portion of the pole face. These arrangements give a low starting torque and are used only for small machines.

In small split-phase motors the necessary phase displacement is obtained by having two stator windings; one, of greater impedance than the other, is wound with high-resistance wire or has its winding partly reversed upon itself, or else has a resistance coil in series with it. In other cases an external choke or resistance may be fitted in the starter. Sometimes the high-resistance winding is designed to carry current for the short starting period only and a switch operated by a centrifugal device is often fitted in the motor to open-circuit the auxiliary winding when the motor is up to speed, whilst in other cases the starting winding is then switched out by hand. In the newer capacitor type, phase displacement is obtained by the use of a condenser or condensers which may be designed either to be left in circuit or to be switched out by hand or automatically.

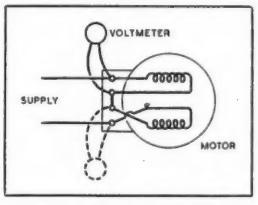


Fig. 2.—Testing series-connected stator windings

Series motors with laminated stators are used on AC supply, but these have the disadvantage of sparking at the commutator due to the heavy current induced in the rotor coils as they are short-circuited by the commutator segments passing under the brushes. Their starting torque is good, but they are not suitable for constant speed drives on variable load.

Repulsion motors also have a series characteristic. The windings on the laminated stator poles are connected to the supply, whilst the brushes are connected together to short-circuit the armature. The stator windings create a pulsating magnetic field in the stator and rotor cores which induces a voltage in the rotor windings. The direction of the induced EMF in the rotor conductors on one side of the axis of each pole is opposite to that in the conductors on the other side of the axis. Consequently if the brushes are lifted clear of the commutator the algebraic sum of the voltages induced in the rotor windings will be zero and no rotor current will flow.

The greatest voltage difference exists between segments at right angles to the pole axis. Between segments 3 and 8 in fig. 1 the rotor coils are in two parallel circuits in which the induced voltages add together. If the short-circuited brushes are placed on these two segments a heavy current will pass through the brushes, short-circuiting connection and the two parallel rotor circuits. The torque set up by the rotor coils lying on one side of the pole axis, however, is opposite in direction to that resulting from the rotor coils on the other side. No rotation results, the motor acting as a transformer with short-circuited secondary winding, and high leakage flux at the air gap.

When the brushes are placed on the pole axis, that is segments 1 and 6, each parallel rotor circuit is formed of coils having opposing voltages, the total voltage and rotor current being zero. Again no torque is exerted by the rotor, and the stator winding passes magnetising current only. Placing the short-circuited brushes on intermediate segments gives a total rotor EMF and current which are less than the maximum obtained with the brushes lying normal to the pole axis. The magnetic axis of the rotor coils now lies on the line OX; the rotor exerts a torque tending to bring the rotor axis in line with the pole axis so that the rotor turns in the opposite direction to the brush movement from the axis OY.

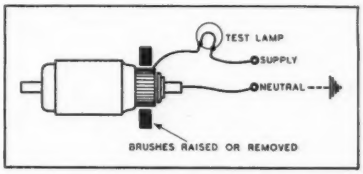


Fig. 3.—Rotor insulation test

The rotor current alternates at the same frequency as the stator supply, but when the motor runs a back EMF is set up in the rotor coils which is proportional to the rate at which these coils cut the stator field. This causes the rotor current to fall in a similar manner to the starting current of a DC motor.

Repulsion-start induction motors are manufactured for outputs up to about 40 HP or so and combine the advantages of the high starting torque and low starting current of the repulsion motor with the constant-speed characteristic of the split-phase induction motor. The accompanying table shows comparative figures of the performance of different types of single-phase motors, together with those obtained from three-phase motors.

COMPARATIVE STARTING CONDITIONS

PERCENTAGE OF FULL LOAD VALUES		
TYPE OF MOTOR	STARTING TORQUE	STARTING CURRENT
3-phase Squirrel Cage ..	100–120	500–600
3-phase Slip-ring	100	100–125
Single-phase } Split-phase }	60–80	400–500
Capacitor Type 1 ..	25–50	300–350
Capacitor Type 2	200–250	400–500
Repulsion-start Induction	300–400	200–350

The repulsion-start motor has a laminated wound stator connected to the supply with a wound armature and commutator of the usual cylindrical pattern or in the form of a bored disc, the brushes pressing on the annular surface. Centrifugal gear in the form of balls or weights which fly out usually at about 75 per cent. of synchronous speed provides the motive power to short-circuit the commutator by pressing a flexible metal disc on the end of

the commutator or by sliding a bracelet of metal links or chain into the bore of the commutator. The brushes are usually not insulated from the motor frame and the centrifugal gear is often arranged to raise the brushes after the commutator is short-circuited in order to minimise wear.

When the motor is switched on the line at starting it develops a high torque as a repulsion motor, the torque falling as the motor speeds up. The short-circuiting of the commutator at the critical speed causes the motor to function as an induction motor with short-circuited rotor, and the speed rises to practically synchronous value on light load with 3 to 5 per cent. slip on full load. Small motors can be started by switching direct on the line, whilst larger motors can be started with reduced current by moving the brushes or by using a starter incorporating a line resistance which is cut out by hand or automatically.

The brushgear can usually be moved sufficiently to reverse the motor or, if the motor is provided with an extra stator winding, a reversing switch can be used without interfering with the brushes. Reversal can only be carried out whilst the motor is at rest or when operating as a repulsion motor at slow speed during starting or stopping.

Stator windings are frequently in two sections, connected in series for use on full voltage and in parallel for half this voltage. The series-parallel arrangement provides a simple means of testing for open circuits or short circuits by comparing the voltage across each section with series windings, or the current in each section when these are in parallel, as shown in fig. 2. Short circuits will show themselves by overheating of the faulty coils; earth faults can be found by the use of an insulation testing set, or by connecting a test lamp between the frame and stator windings. When the motor has an earthed case and the test circuit has an earthed neutral care must be taken to connect the test lamp to the live pole. One result of severe overheating may be damage to the insulation between the core plates; if merely re-wound, without renewal of the core plate insulation, such a motor may run much hotter than before due to increased eddy currents in the core.

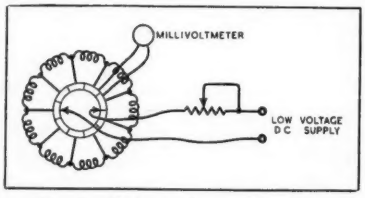


Fig. 4.—Rotor voltage-drop tests

Fault location is simple provided the exact function of the parts is understood. A short-circuited rotor winding or commutator will reduce the starting torque and may prevent the motor starting. If the fault is not serious, however, the motor may reach the critical speed and then continue to run as an induction motor. Such a fault may arise through oil or dirt on the mica between the commutator bars or carbonisation of the mica.

To test for a short-circuited rotor the brushes should be lifted clear of the commutator and the stator supply switched on. A sound rotor should exert no torque and be turned freely in either direction, but a short-circuited coil tends to set itself to encircle the field flux and the rotor will resist movement from that position. The stator current will rise with the rotor so placed and the faulty rotor coil will overheat, the stator windings acting as the primary of a transformer with the defective rotor coil as short-circuited secondary. Should the rotor be short-circuited generally, little or no torque will be developed and the stator current at standstill will be excessive.

Testing for Earth Faults

Since the brushes are not insulated, the effect of an earth fault on the rotor is similar to a pulsating short-circuit when the motor runs. An insulation testing set can be used to check this, or a test lamp can be used, as indicated in fig. 3, the brushes being raised. Another simple test can be made by raising all brushes except one and then switching the supply on to the stator, when an earth fault causes the rotor, if free, to turn to a certain position as with a short-circuited rotor. An earth fault may result from arcing due to faulty brushes or short-circuiting gear.

An open circuit in the rotor will reduce the starting torque, but will not affect the operation past the critical speed. During starting the torque will increase suddenly as the commutator segments connected on either side of the fault pass under the brushes. When the motor starts, a trailing spark occurs at the commutator segments connected to the faulty coil and the segments will be marked by burning after repeated starts. Should the rotor be open-circuited in several places the motor will probably refuse to start, acting as a transformer with open-circuited secondary, the stator passing magnetising current only. Open circuits may occur due to solder melting at the commutator connections as a result of overload or short-circuits at the commutator. The usual bar-to-bar voltage drop tests, illustrated by fig. 4, can be applied to the rotor, as in the case of DC armatures, a high reading indicating an open-circuited coil and a low reading showing a short-circuited coil.

Many faults originate at brush gear due to wear and sticking, especially if the motor has brush-lifting gear. Dirt is liable to collect on the bottom brushes where it is not readily noticed. Imperfect brush contact may result from dirt, burnt commutator, high micas, weak brush springs, or defective centrifugal gear failing to return the brushes to the commutator when the motor slows down. Should all brushes remain clear of the commutator the motor will not restart and the stator will pass magnetising current only. Failure of some brushes to make proper contact reduces the starting torque. The coil short-circuited by each brush produces a reverse torque (see fig. 1) and for this reason narrow brushes, short-circuiting few coils, are often used. On a motor fitted with two brushes the failure of one brush to make contact may cause the motor to turn in the wrong direction, if lightly loaded, due to this reverse torque. Brush resistance is critical and low resistance brushes allow increased current in the short-circuited rotor coils and excessive reverse torque.

Failure to renew worn brushes may result in the brushes leaving the commutator before the short-circuiting gear acts. Sparking at the brushes and short-circuiting contacts can then be expected.

Incorrect brush position reduces the starting torque; the motor may refuse to start or may start in the wrong direction. If the brushes are so placed that the magnetic axes of the stator field and rotor are in close correspondence, a heavy current may pass through the stalled rotor and the stator windings with risk of both burning out. The brush position should be clearly marked before dismantling a motor. Brushgear defects alone cannot affect the operation past the critical speed.

Burnt contacts on the short-circuiting gear, possibly due to worn brushes, may cause "hunting," the rotor being practically open-circuited when the brushes are raised so that no torque is exerted and the speed falls until the brushes again touch the commutator, when the torque causes rise of speed and so on. In motors not fitted with brush-lifting gear, burnt contacts may allow the motor to operate as a repulsion motor at all speeds and the speed may rise over synchronous speed on light load. Dirt or other cause preventing the short-circuiting gear operating during starting will have a similar result.

Should the centrifugal gear stick when running and fail to release the short-circuiting contacts during stopping, the motor will not restart when next switched on. The machine will then be similar to a split-phase squirrel-cage motor with open-circuited starting winding and when the stator is energised an excessive current will be caused to pass through the stator and rotor windings.

Motors should be examined occasionally, especially if they are automatically started, and the starting operations should be checked a few times to ensure that all parts work freely and without undue sparking. The chief risks of serious damage to the motor arise from stalling due to brushes not making proper contact and sticking-in of the short-circuiting gear. The former risk can be minimised by careful maintenance whilst the latter risk can be guarded against by the use of discriminating excess-current protective gear, preferably of the thermal type.

Sodium Lamps in Mines

THE employment of sodium vapour discharge lamps underground in British collieries is being reported upon by the General Research Committee of the Monmouthshire and South Wales Coal Owners' Association. After describing the construction and characteristics of these lamps the first report points out that their light has no merit for visual cleaning purposes and its use is not advisable at the coal face and on picking belts where colour distinction is necessary for distinguishing dirt from coal.

To determine whether such lamps might be useful in other situations tests have been conducted along a roadway underground in a mine placed at the disposal of the Committee by the Powell Duffryn Associated Collieries, Ltd. Five different kinds of fittings were tried experimentally and, although they were all makeshifts, better average illumination was obtained. The minimum was nowhere less than that provided by the tungsten lamps normally employed and the light output per watt input was improved 2.25 times.

Economy of electricity is one of the lesser advantages of this form of light, but the most easily measured. The greatest advantage is probably reduction of glare, particularly when the light is distributed by means of a prismatic glass fitting, which is well suited to the shape of sodium lamps. The low surface brightness of these light sources enables the eyes of men walking inbye to become dark-adapted by the time the end of the illuminated section is reached, so that the men can walk straight in without sitting down to wait for eye accommodation to take place. Miners seem to be specially sensitive to glare and notice its absence more quickly than other workers not so accustomed to abnormalities of illumination.

According to the *Iron and Coal Trades Review* the investigations are proceeding with respect to the design of lamp fittings, which are to form the subject of another report, the intention being to concentrate upon the design and production of a suitable flame-proof fitting.

PERSONAL and SOCIAL

News of Men and Women of the Industry

REPRESENTATIVES of the Electrical Power Engineers' Association recently interviewed the Inverness Electricity Sub-committee with regard to the salaries of **Messrs. R. Stevenson** and **J. S. Oliver,** distribution superintendent and station superintendent, respectively, in the Council's Electricity Department. Mr. J. F. Wallace, assistant secretary of the Association, requested that they should be placed in Grade 3 of the N.J.B. Schedule, but the Sub-committee recommended at a subsequent meeting of the Council that they should be in Grade 5. This recommendation was accepted by the Council with the proviso that as it was unacceptable to the E.P.E.A. the matter should be referred to the National Arbitration Tribunal.

Mr. C. S. Brookes, A.M.I.E.E., who has been appointed deputy electrical engineer at Southwark, was educated at the Hereford Secondary School and received his technical training at Bolton Technical School. He was articled to the borough electrical engineer of Hereford, and has since held positions on the technical staffs of the electricity undertakings at Hereford, Newcastle - upon - Tyne, Bury, Darwen, Peterborough and Basingstoke, before joining Nuneaton Corporation Electricity Department as principal technical assistant, which position he is now vacating to go to Southwark.

Mr. C. S. Brookes

Mr. C. O. Milton, borough electrical engineer at Maidenhead, whose retirement we briefly announced in our last issue, had three years of workshop practice in the electrical department of Richard Evered & Co., at Birmingham, during which period he received technical instruction at the old Midland Institute and at the Birmingham Technical School. He was indentured to the city electrical engineer of Hull for two years, commencing in 1895, after which he became assistant engineer in the Hull Corporation Electricity Department, in charge of the old Dogger Lane power station until 1902, when upon the inception of the Maidenhead electricity undertaking, he was appointed electrical engineer to the Maidenhead Corporation, in whose service he has remained ever since. Mr. Milton is to retire as soon as a successor has been appointed.

Mr. H. L. Milward, of Hopwood Lane, Halifax, has been appointed manager of the Halifax Corporation Transport Department, in succession to Mr. E. McGeorge.

Mr. H. F. Lidster, A.I.E.E., resident engineer with the Exe Valley Electricity Co., Ltd., South Molton, has been elected to fill a vacancy on the South Molton Borough Council.

Mr. J. S. Nicholl, C.B.E., chief executive officer and a director of McNamara & Co., Ltd., has been elected president of the Institute of Transport for the year commencing on October 1st.

I.E.E. Awards.—The Council of the Institution of Electrical Engineers has made the following awards of premiums for papers read during the session 1940-41, or accepted for publication:—Institution Premium: Mr. C. F. Booth. Ayrton Premium: Mr. W. A. Cook, B.Sc. (Eng.). Fahie Premium: Messrs. A. Fairweather, M.Sc., and J. Ingham, M.Sc. John Hopkinson Premium: Mr. G. H. Rawcliffe, M.A. Kelvin Premium: Messrs. C. E. R. Bruce and R. H. Golde. Extra Premiums: Mr. C. G. Garton; Messrs. L. Gosland, B.Sc., and W. F. M. Dunne, B.Sc.; Prof. Willis Jackson, D.Sc., D.Phil., and Mr. A. E. Chester, M.Sc.; Mr. R. Jessel, Ph.D.; Messrs. W. J. Mason and S. A. G. Emms; Mr. G. H. Metson, M.Sc., B.Sc. (Eng.); and Mr. A. Langley Morris. Wireless Section Premiums: Messrs. N. M. Rust, O. E. Keall, J. F. Ramsay, M.A., and K. R. Sturley, Ph.D., B.Sc. (Ambrose Fleming Premium); Messrs. C. A. Mason, B.Sc. (Eng.) and J. Moir; and Mr. R. H. Barfield, D.Sc. Meter and Instrument Section Premiums: Messrs. A. E. W. Austen, B.Sc., Ph.D., and S. Whitehead, M.A., Ph.D.; Messrs. A. J. King, B.Sc.Tech., R. W. Guelke, Ph.D., C. R. Maguire, B.Sc., and R. A. Scott, Ph.D. Transmission Section Premiums: Mr. F. R. Perry, M.Sc.Tech., (Sebastian de Ferranti Premium); Messrs. C. Dannatt, D.Sc., and R. A. Polson, B.E.

The awards for papers read before the Students' Section will be announced later.

In recognition of special work which **Mr. J. C. Dalton,** manager and secretary of the County of London Electric Supply Co., Ltd., and associated companies, has been doing, the War Office has made him an honorary colonel of the Royal Corps of Signals.

Mr. P. H. N. Turner, assistant consumers' engineer to the Finchley Corporation, has received an appointment with the Central Sussex Electricity, Ltd., with headquarters at Haywards Heath. Before going to Finchley, Mr. Turner held similar appointments with the Scarborough Corporation, West Gloucestershire Power Co., and the Dumfriesshire County Council.

Mr. R. W. Ayers has been appointed general manager of Sciaky Electric Welding Machines, Ltd. Mr. Ayers has been responsible for the sales side of this company's activities for a number of years. In addition he is attached to the Ministry of Supply Advisory Service on Welding.

Mr. F. W. Smith, assistant electrical engineer to Edward Lloyd, Ltd., of Sittingbourne and Kemsley Paper Mills, has retired after thirty years' service. Before going to Sittingbourne, Mr. Smith was with Mather & Platt, Ltd., and Ferranti, Ltd. Mr. Smith has been presented with a gold watch by Mr. J. H. Turner, the chief electrical engineer, and with an inscribed Westminster chiming clock by Mr. K. Linforth, manager of the mills. Mrs. Smith has been presented with a case of silver teaspoons.

The retirement is announced of **Mr. R. Buchanan,** firemaster and lighting inspector of Clydebank since 1932. He was responsible for carrying out a few years ago the electrification of the closes and stairs in the town and the installation of the mercury vapour system of street illumination.

Sir Geoffrey R. Clarke, C.S.I., O.B.E., who has served as president of the London Chamber of Commerce for the past year has been nominated for re-election for the ensuing year. Sir Geoffrey is managing director of the Telegraph Construction and Maintenance Co., Ltd., and chairman of the Calcutta Tramways Co., Ltd., as well as being a director of other companies. The annual meeting of the London Chamber of Commerce was to be held yesterday (Thursday).

Sir Geoffrey R. Clarke

We regret to learn that **Mr. W. Frost,** senior charge engineer with the Greenock Corporation electricity undertaking, was injured during a recent air raid.

Mr. G. Parr, who has been in charge of the technical service section of the Radio Division of the Edison Swan Electric Co., Ltd., has resigned to take up the position of editor of *Electronic Engineering*.

Mr. Harry Moss informs us that he has been appointed electrical engineering instructor for the training of Royal Engineers.

Major A. L. Trundle, F.C.I.S., who until recently was chairman of the Electric Vehicle Association of Great Britain, Ltd., has been appointed assistant general manager for personnel of the N.A.A.F.I., a post which entails the supervision of 40,000 workers.

Obituary

Pilot-Officer H. H. Hirst.—In our last issue we announced the loss, while on operational duties with the R.A.F., of Pilot-Officer Harold Hugh Hirst. He was the only son of an only son. His father died as a result of the last war, and his birth a few months after his father's death brought a great measure of consolation to his grandfather, Lord Hirst, to whose title he was the only heir. He was only twenty-one years of age.

The late Pilot-Officer H. H. Hirst

Mr. W. A. Ritchie.—As we briefly reported last week, the death occurred on May 10th of Mr. W. A. Ritchie, the late manager of the Hendon Electric Supply Co. Mr. Ritchie served an apprenticeship to mechanical engineering at Blackness Foundry, Dundee, and was appointed junior assistant with the Walker & Wallsend Union Gas Co. at its Tyneside electrical undertaking, which was merged eventually in the N.E.S. Co., Ltd. After a short time with the Charing Cross & Strand Co., he entered the service of the Electric Supply Corporation, Ltd., as their district engineer for Scotland with headquarters first at Dalkeith, and later at Dumbarton, where he was responsible for laying down the complete installation including steam-driven generating plant. In 1910 he, with Mr. W. R. Underhill, formed the company of Underhill & Ritchie, Ltd., electrical engineers, Glasgow, and during the last war this firm equipped many minesweepers and other auxiliary naval craft, in addition to many munition factories. Mr. Ritchie was appointed manager of the Hendon Electric Supply Co., Ltd., in 1923. When the company was absorbed by the Northmet Power Co. in 1939, he became district superintendent of the Hendon undertaking which included, in addition to the area of the old Hendon Company, part of the Edgware undertaking of the Northmet Co.

Mr. E. N. Pink.—The sudden death of Mr. Edward N. Pink, B.Sc., A.M.I.E.E., at the age of fifty-eight, is announced from Edinburgh. He was Assistant Professor of Electrical Engineering at the Heriot-Watt College and had been on the staff of the College for twenty-two years. He was a graduate of London University and served a pupilage in mechanical engineering with John Musgrave & Sons, Ltd., Bolton. He was then engaged in power station work with Portsmouth and Lancaster Corporations. Subsequently he gained experience in the manufacture and erection of machinery with Siemens Bros. Dynamo Works at Stafford and in the Outside Erection Department of the British Westinghouse Co. at Manchester.

Mr. Pink was then for some time engaged in the Charlottenburg works of Siemens-Schuckert and with the Bergmann Electricitäts Gesellschaft in Berlin, where he was employed in the design of electrical machinery. He subsequently founded the business for the manufacture of certain patented articles, but this business came to an end owing to the outbreak of war in August, 1914, when he was interned in Germany. He was appointed lecturer in electrical machine design and drawing in the Heriot-Watt College on returning to this country, and became assistant professor in 1920. Mr. Pink was the author of "Electric and Magnetic Circuits, AC and DC," and was joint author with Professor Say of a textbook on "Theory of A.C. Machinery." He leaves a widow, two sons and a daughter.

Mr. F. F. Elliott.—In our last issue we briefly announced the death on May 8th of Mr. Frederick Forrester Elliott, borough electrical engineer of Woolwich. Mr. Elliott was born in 1892 and was educated at Finsbury Technical College under Sir William Thompson. In 1911 he was appointed assistant engineer to the Thorpe Meter Co., and in the following year joined the City & South London Railway as shift engineer. He was appointed contract engineer with British Insulated Cables, Ltd., in 1914, and a year later became engineer-in-charge with the County of London Electric Supply Co., Ltd., with whom he remained until 1920, when he went to Woolwich as station engineer in charge of generation to the Woolwich Borough Council. He was appointed borough electrical engineer in 1931.

Mr. Elliott was a member of the Institutions of Mechanical and Electrical Engineers, the I.M.E.A., and of the Associated Municipal Electrical Engineers (Great Britain and Ireland). He was a representative member of the Electricity Supply Industry District Council (No. 10) Greater London Area, Employers' Side, and of the Consultative Technical Committee, S.E. & E. England Area, Central Electricity Board. He was also a member of the Exhibition Committee of E.D.A.

The funeral of **Mr. Thomas Ormiston Callender** took place at Erith Cemetery on May 14th. The coffin was carried to the place of burial between lines of members of Callender's Home Guard and Callender's Band. The interment was preceded by a service in St. John's Parish Church, Erith, at which the Rev. Morey, of Erith Parish Church and the Vicar of Bidborough officiated. The mourners included : The widow, Mr. and Mrs. W. G. Hendrey and Miss Lane, Mr. and Mrs. W. H. Cumming, Mr. Cumming, junr., Mr. W. H. Pinnock, Mrs. Cyril Johnson and Mr. Gavin Harris. Callender's Cable & Construction Co., Ltd., was represented by Sir Malcolm Fraser, Bt., C.B.E., Maj.-Gen. The Hon. Sir Frederick Sykes, P.C., G.C.S.I. (directors), Mr. C. Pipkin (director and joint manager), and Mrs. Pipkin, Mr. H. Foulds (advisory director and secretary), Mr. E. M. Malek and Mr. H. Flannery (advisory directors), and other members of the company. Others present included, Lord Dudley Gordon, the Mayor of Erith, Councillor G.W. H. Luck, J.P., Ald. W. J. Ramsden, Councillor J. W. Wilkinson, and Mr. Douglas Twigg, Town Clerk; Commander W. T. Bird, director of Thomas Bolton & Son; Mr. A. H. M. Jacob, representing Sir Montague Hughman and Mr. Bishop, directors of W. T. Henley's Telegraph Works Co., Ltd.; Mr. D. McLay, representing St. Helens Cable & Rubber Co., Ltd.; and Mr. V. A. Patterson, representing J. & E. Hall, Dartford.

The late Mr. T. O. Callender

Mr. Charles Seymour, whose death has occurred at Rugby, had for many years been associated with the English Electric Co., Ltd. Half a century ago he joined the staff of Willans and Robinson, Thames Ditton, Surrey, which later became merged in the English Electric Co., and Mr. Seymour went to Rugby with the Company in 1897.

Mr. D. M'Dougall.—We regret to learn of the recent death by enemy action of Mr. Donald M'Dougall, A.M.I.E.E., electrical engineer and manager of Greenock Corporation Electricity Department since 1928. Mr. M'Dougall served his apprenticeship with Claude Hamilton, Ltd., Glasgow, and John Brown & Co., Ltd., Clydebank. After working with two contracting firms in Glasgow, he joined the British Westinghouse Co. In 1911 he went to Greenock as electrical sub-station superintendent under the late Mr. J. A. Robertson. He became chief assistant engineer in 1918, and ten years later, when Mr. F. H. Whysall went to Belfast, he was appointed electrical engineer and manager. He was a member designate of the Council of the I.M.E.A.

Pilot Sergeant P. C. T. Forster.—We regret to hear from Mr. H. R. G. Forster, A.M.I.E.E., of Portland, Dorset, that his son, Pilot Sergeant Peter C. T. Forster, D.F.M., B.Sc. (Hons.) Grad. I.E.E., has been killed on active service. Pilot Sergeant Forster was a student of Queen Mary College, University of London, at the outbreak of war.

Sir Bertram Hayes.—The death is announced at the age of seventy-six, of Sir Bertram Fox Hayes, formerly Commodore of the White Star Line and a director of the Marconi International Marine Communication Co., Ltd.

CORRESPONDENCE

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions.

Force Trip Devices

IN an article under this title in the ELECTRICAL REVIEW of April 11th, Mr. R. T. Lythall states that, in certain conditions which he specifies, "force trips" or "inertia trips" have a "blind spot" at which they become inoperative, and that consequently a circuit-breaker dependent on such a device may become more dangerous than one not so equipped.

It should be pointed out, however, that whilst this is true of certain defective types of "force-trip" which act only on a *reversal* of the closing movement of the contacts, the "inertia-trip" embodied in some modern breakers is free from such "blind-spot" defects, and ensures the opening of the breaker even under the balanced "equal and opposite forces," or "stalling" conditions cited by Mr. Lythall, or under any other conditions which retard the normal quick and complete closing of the contacts.

But, quite apart from the capacity to function under the conditions mentioned, a Metrovick breaker, in most cases, would have already tripped out *before* the trouble had developed to the stage envisaged in Mr. Lythall's interesting article. Oscillograph records of the "make-break" movements of the contacts of such "inertia-trip" breakers operating under short-circuit conditions, indicate the duration of the interval between the commencement and the interruption of the short-circuit as being of the order of 0.04 sec.

Manchester. G. DEWAR.

Electrical Functions

IF Thackeray came to earth again and wrote a second edition of his "Book of Snobs," perhaps he would devote a complete chapter to the professional organisations. A paragraph might even relate how at a most critical period of this totalitarian war to the death we have been invited by the Meter Section of the I.E.E. to meet informally for lunch at a price of eight shillings a head, excluding wines !

A social event is an excellent idea, but why make it so extremely exclusive ?—so as to exclude, in fact, all that great majority of Meter Section members whose finances make them unable, or whose patriotism makes them unwilling, to spend twelve or fifteen shillings on a lunch (assuming extras on the usual scale). One thought the Government had done all it could to reduce private spending and its accompanying dissipation of man-power—what with savings exhortation, taxation and even downright prohibition—but apparently they have not been specific enough for our governing committees. They prevent large meals being served, but they do not prevent large sums being paid for them. The lunch must be short, but the bill may be as long as you like.

In the meantime, if we are to escape further restrictions such as having our meals rationed in value as well as in size we must really use our own discretion. Is it suggested that in the whole of Central London it is impossible to find a room where we can have our "one principal dish" for less than 8s. a head, or have our committee men become so obsessed by the classy and starchy pre-war functions that they cannot think in any other terms?

Criticism, it is said, should be constructive and not merely negative. In addition to a purely social function of the type proposed (but at half the price) could there not be some summer meetings now that the light permits ? These might be of a less formal, more social type than in peacetime, and might each include one or two short papers and discussions, broken up by buffet refreshments. Many Institution members, not only those of the Meter Section, miss the opportunities which meetings afford and cannot attend the occasional Thursday afternoon lectures. There are plenty of technical difficulties and developments concerned with war conditions or post-war plans which could usefully be discussed without giving away vital secrets and with great mutual advantage.

*London, W.*1. METER MEMBER.

Hydrogen-Cooled Alternators

IN a recent address to the Missouri Valley Electrical Association, Mr. D. E. Snell stated that several 20,000-kW generators had been built with hydrogen cooling, and that the application of the system to even lower ratings was being studied. Since the first hydrogen-cooled alternator was placed in operation in October, 1937, by the Dayton Power & Light Co., more than forty units of this type, with a combined capacity exceeding 1,750,000 kW, had been placed in operation in the United States, including, during the past two years, 70 per cent. of the total kW of generators ordered from the General Electric Co. No breakdowns from the failure of hydrogen features had ever been experienced. Operation of the various auxiliaries was almost automatic, the principal manual operation consisting of changing the hydrogen cylinders.

The principal advantage of hydrogen cooling over air cooling was a large reduction in windage loss and a resultant improvement in efficiency because of the low density of hydrogen. In addition, temperature rise was considerably less. Net yearly savings ranged from about £200 for a 20,000-kW, 3,600-RPM generator to about £4,000 for a 160,000-kW, 1,800-RPM unit. Hydrogen cooling, he claimed, also meant quieter operation, elimination of fire hazards, prevention of the harmful effects of corona in the stator insulation and absence of moisture, oxygen and dirt, resulting in longer insulation life and reduced maintenance.

The most important single constructional feature was the arrangement for sealing the rotating shaft against the outward leak of hydrogen and the inward leak of air. This was done by an oil-film shaft seal supplied with vacuum-treated lubricating oil under pressure.

Irish Bacon Factories

Improvements Recently Effected

IN the last three years pig breeding in Ireland has been intensified and the resulting expansion of the Irish bacon industry has led to the modernisation of various factories. Thus Henry Denny & Sons, Ltd., one of the oldest firms in the bacon curing industry, have re-arranged the machinery in their factories at Waterford, Cork, Sligo and Portadown so as to allow of the better use of electricity. The combined rate of handling now averages 200 pigs per hour, and roughly half a million per annum.

All four factories take electricity from public supply concerns; in the case of Portadown from the Electricity Board for Northern Ireland and the others from the Electricity Supply Board, Eire, in all cases at 400 V, 3 phase, 50 cycles. The primary product is dry cured bacon and the by-products are lard, sausages, cooked hams, meat and bone meal and dried blood.

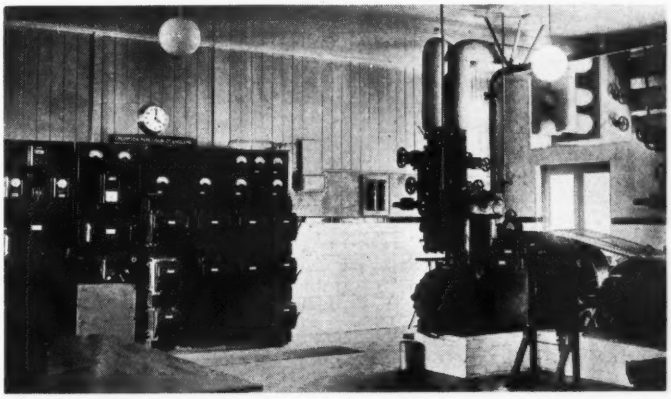
The factory in Portadown, which was opened in 1934 and deals with 1,000 pigs a day, is equipped throughout with Crompton Parkinson motors. Electricity also drives the Sligo factory, which was opened in 1933, its capacity being 400 pigs a day. At the Cork factory motors have replaced a suction gas plant which was driving DC generators. The capacity of this factory is 1,000 pigs a day and the change-over involved the installation of about fifty motors, ranging from 75 to ½ BHP.

The remaining factory of this group, the largest, with a capacity of 1,500 pigs a day, at Waterford, originally had two 150 BHP suction gas engines driving on to a common shaft, operating two 110 V DC generators and five 20-ton horizontal Sulzer compressors. In 1939 the old engine room was discarded and a new compressor room built on an adjacent site. Again the motors and switchboard were obtained from Crompton Parkinson, Ltd. J. & E. Hall's refrigerating machinery was ordered and the electrical equipment was installed by Keatinge & Gaule, electrical contractors, Waterford.

In summer months power taken for refrigeration amounts to over 80 per cent. of the total factory consumption; consequently economies have to be effected by arranging the compressor plant in suitable units which can be started or stopped instantly as conditions demanded. The three twin-cylinder Monobloc compressors, each driven by a 70-HP slip-ring motor, installed have split suctions and each suction is connected through valves to three main suction lines. Thus any cylinder may work on any one of the suction lines. To make the plant even more flexible the compressors are fitted with half-duty valves. To ensure correct control a Negretti & Zambra 16-point distant electric thermometer indicating the temperatures of all curing cellars, chill rooms and cold stores throughout the factory enables the compressor room attendant to regulate the running of the compressor plant to very exact requirements. Two condenser water and two brine circulating pumps by the Pulsometer Engineering Co., are directly coupled to Crompton Parkinson motors. Electricity is purchased on the maximum demand basis and in this connection an integrating meter with alarm device is fitted on the main switchboard to call attention to the need for reducing the load.

In addition to the three 70-HP motors driving compressors, there are about 60 motors throughout the factory ranging from 25 to ½ BHP. Particular care in laying out the installation was taken to standardise, so far as was possible, the horse-power, speed and type used with a view to interchangeability of motors, when required. The majority are totally enclosed, for the atmosphere is very damp and salty.

Although the new plant has only been running since the end of April, 1940, savings in running costs have proved very considerable. Engine room attendants, who had a full-time job in the old engine room, are now able to give more than half their time to routine factory work. Three shifts are worked on four days and two shifts on the other two days. The electricity consumption has been found to be from 30 to 40 per cent. less than what was estimated.



The compressor plant, showing the controls of three Crompton Parkinson motors

Henry Denny & Sons, Ltd., are able to produce figures of another bacon factory carrying out exactly the same processes as are employed at Waterford, but dealing with 30 per cent. fewer pigs, and in which the old-fashioned refrigerating machinery was retained, the current consumption in this factory being 96,000 kWh over a certain period against 65,000 kWh consumed during the same period at the Waterford factory.

The Glen Affric Scheme

Questions in Parliament

IN the House of Commons last week Mr. N. Maclean asked the Secretary of State for Scotland whether he had received the report of the Commission on the Glen Affric scheme of the Grampian Electric Supply Co.; and whether, in view of the strong feeling in Scotland over this scheme, and the fact that it would not benefit the war effort, he would suspend the consideration of the report until the end of the war.

Mr. Johnston said he had received the report of the Commission which, after inquiry into the Grampian Electricity Supply Order recommended that it should be issued with certain modifications. He had no power to prevent individuals from promoting Orders nor to prevent Parliament from discussing and deciding upon contentious private legislation. In accordance with his duties under the Private Legislation Procedure (Scotland) Act, 1936, he would be required to submit at some convenient date a Confirmation Bill. The responsibility for accepting or rejecting that Bill would then rest upon Parliament.

Mr. Maclean asked the Secretary of State whether he could make a statement about the hearing of the case for the Glen Affric plans of the Grampian Electric Supply Company; on whose authority members of the public were refused admission to the hearing; whether a shorthand verbatim report of the evidence was taken; and whether this would be printed and circulated, as was the rule in other important cases heard by the Commissioners and in which the public was keenly interested.

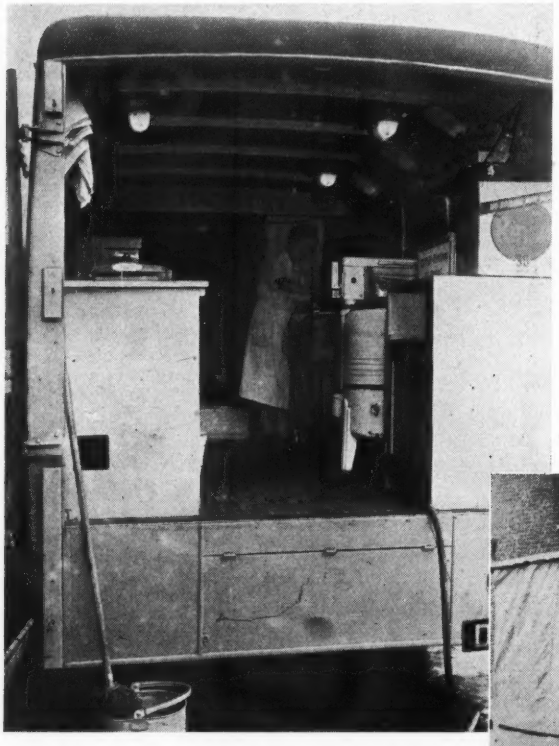
Mr. Johnston said that Defence Regulation 6B provided that where it was certified by the Secretary of State that it was necessary in the interests of the defence of the realm that an inquiry by Commissioners under the Private Legislation Procedure (Scotland) Act should not be held in public, the chairman of the Commissioners was to give directions accordingly and also to secure that no copy of the evidence was to be supplied except to the Secretary of State or to any party having a *locus standi* to appear at the inquiry. In the case of this inquiry he was advised that statements were likely to be made not only about the proposed new works but about the position and capacity of existing generating stations and transmission and the present and prospective load in the area north of the Forth for domestic, industrial and war needs, and he therefore granted a certificate under the regulation. A shorthand verbatim report of the evidence was taken and while its publication would be contrary to the Regulation he was considering means by which members would have an opportunity of seeing the evidence.

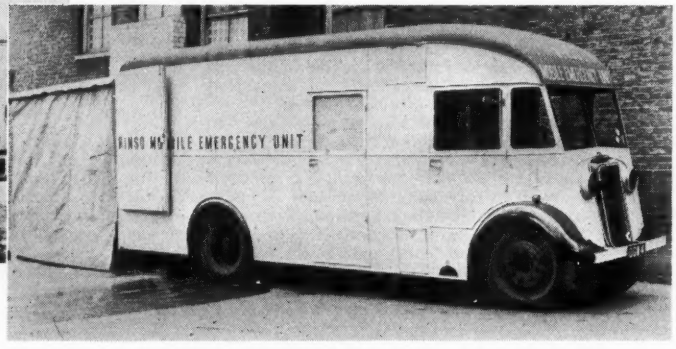
Mr. Maclean asked if this was not a "complete violation of the whole situation in this part of Scotland." Was it not a fact that all that was necessary to be known was already known, and that all this secrecy was causing great unrest in Scotland with regard to the promoters and the scheme? Many would like to know why this matter was being singled out, as it was something which could not in any degree be of help during this period of the war.

Mr. Johnston replied that he could only say that the advice given to him was entirely contrary to the statement made by the hon. member, that the position and capacity of existing generating stations and transmission lines were likely to be elaborately referred to before the Commission.

All-Electric Mobile Laundries

TO assist people who have been rendered homeless by bombing, R. S. Hudson, Ltd., have made available two all-electric mobile laundries, the forerunners, it is hoped, of others. Before the war these two units were employed for "Rinso" demonstration work, and re-equipment has been necessary to make them self-contained and to enable them to undertake their new duties without having to rely on any exterior services. Though externally the vehicles differ somewhat, one being a 28-HP "Commer" van with an orthodox body and the other a similar vehicle of a streamlined design, the layout of the two units is almost identical.





Interior and exterior views of one of the all-electric mobile laundries

In each case the necessary electricity supply is derived from a 250-V, 30-A DC generator driven by the car engine, and water tanks having a capacity of 270 gals. have been provided behind the driver's seat. The washing is done by means of "Thor" electric washers and wringers, one on each side of the interior. The necessary hot water is obtained from two "Burco" wash boilers (2.5 kW), which are normally situated underneath the draining board attached to the wringers.

Whenever possible drying is done out of doors, but in case this is impracticable there is a "Dridare" drying cabinet available which folds up against the wall when not in use. As the fan in this cabinet operates from AC a small AC convertor (Electro-Dynamic Construction Co.) has been installed. A "Vent-Axia" fan incorporated in the roof extracts the steam. Although ironing is not generally undertaken, an electric iron is available if required. Lighting of the van is carried out by means of bulkhead ceiling fittings, and as on occasion it may be necessary for the operators to use the vehicle as their "home," a convection heater is provided to make them as comfortable as possible. In spite of this comprehensive array of apparatus there appears to be adequate room for the operators to work in.

At the moment the vans are operating in the Merseyside and London areas, going to those districts which are most in need of their help and staying there as long as they are required. Each of the vehicles has a complement of three women to operate it. Mrs. M. Berry and Mrs. F. C. Clark, trainees of the Rinso Wash Testing Laboratories, are running the one we inspected in London, with Miss P. Head acting as combined chauffeuse, mechanic and electrician. It speaks well for Miss Head's competence that the whole of the equipment has been running almost continuously for a fortnight without any trouble whatever.

No charge at all is made for this public-spirited service rendered by the company and Mrs. Berry told us that it is possible for each laundry to deal with the washing for about 35 families a day, allowing 10 lb. per family. With the help of the local W.V.S., who are co-operating in the matter of marking, drying, ironing, airing, etc., as many as 500 articles have been handled in a day. Sheets, pillow cases, underwear, children's clothes, etc., are the items principally dealt with and the operators' training has stood them in good stead in treating the very badly soiled articles which are, of course the rule rather than the exception in the circumstances.

Tin Research in 1940

THE most noteworthy fact about the work of the Tin Research Institute in 1940 (summarised in report No. 103) is the large increase in industrial contacts made. Long-term research has been kept in the background by concentration upon war-time industrial needs, one example of which is the prevention of hydrogen embrittlement in electro-tinned engine parts, together with collaboration with the Royal Aircraft Establishment, the Admiralty and the Ministries of Aircraft Production, of Supply, and of Food. There have been fewer calls for purely bibliographical references and more inquiries have necessitated personal visits and laboratory experiments, while assistance has been rendered in laying out new and redesigning old plant.

The equipment of the laboratories at Greenford has enabled researches to proceed much more quickly than when tests had to be made elsewhere. Alloy investigations have been helped considerably by the installation of electric ovens and furnaces for heat treatment and melting as well as for annealing in the hot-tinning section. The chemical analysis section has facilitated progress, particularly in electro-plating, and in the workshops much apparatus has been constructed which would otherwise have been unobtainable.

Of the four patents applied for during 1940, one protects an electromagnetic instrument for determining the thickness of tin coatings. It is being produced commercially by Salford Electrical Instruments, Ltd. During the year the Institute advised and assisted in the installation or modernisation of some twenty plating plants. Developments being fostered among large food manufacturers and canners include heavily coating trays and other food-handling equipment by a combination of hot-tinning and electro-tinning to make them more durable and enable them to be kept in good condition relatively cheaply by regular re-electro-tinning. The electro-tinning of small steel articles by the barrel-plating process has been satisfactorily worked out.

Technical development of white bronze coatings (on spoons and forks, for example, which are regularly rubbed and washed) has been hindered in this country by wartime lack of interest in a decorative process and in America by patent negotiations, but two new plants have been installed in this country and others are being discussed. The electrodeposition of high-copper bronzes was originally intended to be a cheap and easily polished alternative to nickel, used as an undercoat for chromium plating. It was not accepted for that purpose, mainly because of its colour; but other uses are being studied, in particular for salvaging worn machine parts and components rejected as under size.

Change in the Shipyard

How the Electrical Industry might Benefit

By J. F. Amor

A PROPOSAL by one of our younger naval architects, Dr. J. Tutin, to build ships by what has been described as the "conveyor-belt system" suggests new methods of ship construction with the object of more rapid production. This proposal, which has the support of eminent authorities in shipping circles, is to build ships in the water instead of on a slipway and move them along during the progress of the work to the place of manufacture and assembly of the various constituent parts. The scheme would necessitate the construction of a canal or waterway with the workshops on either side, and the ship would reach the end of the canal complete with its engines and almost ready for commissioning. The principal advantages claimed are speed of construction and the elimination of launching difficulties.

Many of the obstacles to the widespread use of electrical gear aboard ship, and particularly the use of electrical propelling machinery, have been due to shipbuilding practice, which did not always fit in with the ideas of electrical engineers. For instance, many shipbuilders found it more convenient to build steamships of a more or less standardised pattern with auxiliary machinery, such as winches and steering gear driven by steam. They claimed that steam-driven gear was simpler, more robust and more reliable than electrical apparatus, and in addition they always pointed out that electrical machinery needed engineers with electrical training.

The arguments against electrical machinery may be compared with those of earlier years against the Diesel engine for ship propulsion. The latter had to be adopted because British shipowners found that foreign competitors were beating them by running motor ships which, although more expensive in first cost, were far more economical on many services than coal- or oil-fired steamships. Demands of British shipowners forced many shipbuilders to alter their outlook and they took up licences for the manufacture of internal combustion engines in order to enable them to compete with Continental shipbuilders who were eagerly seeking contracts to build motor ships for British owners.

The author maintains that the rapid construction of ships necessitated by present conditions should favour the employment of electrical propulsion and electric welding

The increase in the number of motor ships led to the wider use of electrically driven deck and engine-room auxiliaries, even for steamships where it was found that Diesel engine-driven generators enabled the boilers to be shut down in port. Thus developments in marine electrical gear had an effect on steamship equipment.

Some shipbuilders have stated that they would be more favourably inclined towards large all-electric ships if they could themselves manufacture the main items of the turbo-alternators and propulsion motors to compensate them for the loss of work they would sustain by not supplying the main engines. This arrangement would be uneconomic, since the manufacturing capacity of the existing electrical works is sufficient for our requirements in normal times. Moreover, the existing electrical works are much more modern than most shipyards, where engine works are not laid out for manufacturing and testing electrical gear.

In effect, the problem which faced electrical engineers was always that of adapting their schemes to a definite design of vessel constructed on orthodox lines and generally it was difficult to show any advantage for electrical propulsion over the straight steam or Diesel-engine drive. It is not efficient to take any ship already designed with a straight drive and simply substitute electrical propulsion machinery. The successful electric ship is one which is designed originally to utilise electrical machinery, just as the successful steamship is constructed as such and is not merely a sailing ship, minus the sails, fitted with an engine-driven screw.

The Mining Parallel

There are, of course, rough parallels in other industries where machinery has altered production methods and new production methods in their turn have encouraged new machinery. Perhaps the mining industry is as good as example as any, for one can see the requirements of mining modifying the design of electrical gear and at the same time the developments in electrical gear affecting mining methods.

A new method of constructing ships will naturally tend to modify the design of the ships themselves and in the method under discussion it seems that the present lay-out of shipyards will be radically altered. There will be arguments against the engine-building works forming part of the shipyard and, if these are valid, shipbuilders will be of a new type free to select any propelling machinery whether it be steam, Diessel or electric without worrying about the economic consequences to themselves.

At the present time we have urgent need to build ships as quickly as possible and this inevitably means new shipyards either in this country or in the Dominions. The new shipyards must embody the latest technique in industrial production and must also be suitable for the future needs of the shipping industry. The war has telescoped the industrial developments of years into months in many directions and it is certain that many of the shipbuilding ideas even of 1939 will be totally inadequate for the conditions of the post-war period. Ships will always be necessary to our island existence, and consequently we must use the developments forced on us by war to help us in the future peace.

The electric ship is now an accomplished fact and development has proceeded steadily in spite of all the prejudice and other obstacles in the way. Electrical engineers should now be ready for a jump forward in the application of electrical gear to marine use and they should be preparing for close co-operation with the younger naval architects, some of whom will be found willing to consider ideas on ship design and construction even from those outside the shipbuilding industry if they have something sensible to say.

It is not only with the use of electricity aboard ship that the electrical engineer is concerned, for new methods of construction involve new handling devices and above all there will arise the question of electric welding. It is surprising that electric welding has not been used far more extensively in the shipbuilding industry to produce cheaper and lighter ships more quickly. A new type of shipyard will not need to make welding practice fit its production methods, for it can be laid out to utilise electric welding to the maximum and electrical engineers may legitimately look forward to the all-welded electrically propelled ship as the normal product of our shipyards.

Simply looking forward is, however, not enough and the question arises as to how electrical engineers should turn this possibility into a concrete accomplishment. First of all on the technical side they should establish really close co-operation with naval architects in a definite form, the objective being the all-welded all-electric ship as the most efficient ship in construction and operation.

An electric ship is not necessarily higher in first cost than other types, but even if it were, the operating advantages would offset the difference. At the present time we require ships capable of the utmost flexibility, suitable for any port irrespective of the handling facilities and able to give a quick turn round. Above all, we require these ships constructed quickly. The electric ship fulfils the requirements of flexibility; it is more easily manœuvred than any other ship and electric cargo handling gear makes it independent of shore cranes.

Freedom of Design

Where a straight drive is employed, the main engines are necessarily tied down to a definite position in the ship and this limits the design and disposition of the cargo space, but with the electric ship the engine room can be laid out to suit the cargo space and the cargo handling facilities. This is an extremely important point when speed of loading and unloading is vital.

As for rapid construction, it is obvious that a plant lay-out which enables component parts to be manufactured in specialised factories leads to speedier production than a lay-out which forces widely differing items to be made in relatively small quantities in the same factory. Aircraft, for instance, are not manufactured completely in one factory or in one part of the country.

Other ships than electric ships could, of course, be built on the principle of making the engines in one factory and building the hulls in a yard entirely separate, but the very fact of separating the hull and main engines is in favour of electric ships, since designs have tended to be based on the assumption that hulls and main engines will be made in one yard.

Looking at the matter from the commercial angle we see the shipping industry as an important market for electrical gear worthy of approach on organised scientific lines and, here again, the implication is the absence of any real plan in the past.

The war has altered our attitude towards many things and we are now used to rapid changes of all kinds, but we have not yet acquired the habit of foreseeing the consequences of these changes. The electrical industry in its own interest must take advantage of changes wherever possible, and ship construction offers an opportunity since the urgent need for ships means that the necessity for rapid production will override many considerations previously thought important.

INSTITUTION PROCEEDINGS

Post-war Lighting Standards. *I.E.E. Sectional Committees.*

Reconstruction Lighting Problems

SPEAKING on Mr. R. O. Ackerley's paper on "Lighting and Reconstruction" at a meeting of the ILLUMINATING ENGINEERING SOCIETY on Tuesday last week, Mr. W. J. Jones referred to the action taken by the Joint Lighting Committee of the Architectural Profession and the Electric Lamp Manufacturers' Association. In presenting the broad problems of lighting to the Minister of Works and Buildings, apart from offering the Ministry every possible assistance in dealing with lighting problems whether post-war or prevailing to-day, the Joint Committee drew attention to some of the more important general phases of the problem and made a number of suggestions.

The lighting levels in Government premises compare most unfavourably with those of a corresponding character in commercial premises. It is therefore proposed that the present specification for the lighting of Government premises should be revised so that in new buildings as well as existing buildings the lighting provided shall be of a more suitable character. It is also proposed that the wiring facilities and services should be adequate and of such a character as to take care of possible future requirements.

As regards the lighting of public buildings controlled by local government authorities, including libraries, hospitals, museums, clinics and public halls, it is proposed that new buildings shall be provided with up-to-date standards of illumination in accordance with the agreed specifications where they exist.

It is recommended that should the Government make grants for the rebuilding of churches; one of the conditions should be the provision of adequate and suitable lighting throughout. The recommendation of the Board of Education on lighting should be compulsorily adopted when rebuilding schools.

It is proposed that when planning and designing the electrical services for commercial premises due regard shall be given to the requirements of floodlighting and advertising, together with adequate provision of services inside the building. An over-riding requirement is that the lighting shall be designed at the same time as the building.

It is proposed that the appropriate Ministry shall adopt a specification put forward by the Joint Committee for minimum requirements in domestic premises so far as electrical services are concerned. These requirements have the support of the Royal Institute of British Architects and the electrical industry. The schedule is arranged in two parts, one covering dwellings with a floor area of 1,200 sq. ft. or less and the other larger houses up to 2,000 sq. ft.

I.E.E. Committee Nominations

IT has hitherto been the practice of the INSTITUTION OF ELECTRICAL ENGINEERS to circulate nominations of the three Sectional Committees to members. This year, in order to conserve paper, the Institution has asked us to publish the nominations for the 1941-42 session in full and we have pleasure in doing so. They are as follows :—

Meter and Instrument Section

Chairman : W. Phillips, Member (Elliott Bros. (London) Ltd.); *Vice-Chairman :* E. H. Miller, Member (Sangamo Weston, Ltd.); *Ordinary Members of Committee* (Three vacancies) : A. T. Cuss, Associate Member (Islington Electricity Department), E. Fawssett,. Member (North-Eastern Electric Supply Co. Ltd.), and L. J. Matthews, Member (Electrical Apparatus Co., Ltd.).

The Committee of the Section for the present session is as follows:—

Chairman : *C. W. Marshall, B.Sc.; *Vice-Chairman :* *W. Phillips; *Immediate Past-Chairman :* *F. E. J. Ockenden; *Ordinary Members of Committee :* A. H. M. Arnold, D.Eng., Ph.D. *F. J. Lane, M.Sc., A. T. Dover, *E. H. Miller, D. C. Gall, E. W. Moss, L. B. S. Golds, A. G. O'Neill, *C. W. Hughes, B.Sc., W. G, Radley, Ph.D.(Eng.), A. E. Jepson and S. H. Richards, together with the following *ex-officio* members :—The President, the Chairman, Papers Committee, and V. Z. de Ferranti (Council representative).

Transmission Section

Chairman: S. W. Melsom, Member (Cables Makers' Association); *Vice-Chairman :* P. E. Rycroft, M.B.E., Member (Great Yarmouth Electricity Department) ; *Ordinary Members of Committee* (Four vacancies): C. F. Bolton, Associate Member (Central Electricity Board), F. Favell, Member (North West Midlands Joint Electricity Authority), F. de B. Hart, Member (Callender's Cable & Construction Co., Ltd.) and A. H. Roberts, Associate Member (Siemens Bros. & Co., Ltd.).

The Committee of the Section for the present session is as follows:—

Chairman : *H. J. Allcock, M.Sc.; *Vice-Chairman :* *S. W. Melsom ; *Immediate Past-Chairman :* *F. W. Purse ; *Ordinary Members of Committee :* *W. M. Booker, E. T. Norris, W. Fennell, *J. S. Pickles, B.Sc.Tech., R. E. G. Horley, *T. R. Scott, B.Sc., J. W. Leach, F. H. Sharpe, B.Sc., J. A. Lee, J. A. Sumner, W. H. Lythgoe and *H. Willott Taylor, together with the following:—The President, the Chairman, Papers Committee, J. M. Kennedy (representing the Council), P. B. Frost, B.Sc.(Eng.) (representing the Post Office), H. W. Grimmitt (representing the Electricity Commission) and C. W. Marshall, B.Sc. (representing the Central Electricity Board).

Wireless Section

Chairman : H. Bishop, C.B.E., B.Sc.(Eng.), Member (British Broadcasting Corporation); *Vice-Chairman :* A. H. Mumford, B.Sc.(Eng.), Member (Post Office Engineering Department); *Ordinary Members of Committee* (Five vacancies): H. G. Beer, Associate Member (Post Office Engineering Department), F. P. Best, M.Sc., B.Eng., Associate Member (Marconi International Marine Communication Co., Ltd.), H. G. Hughes, M.Sc., Associate Member (H.M. Signal School), Prof. Willis Jackson, D.Sc., D.Phil., Associate Member (Manchester University) and H. A. Thomas, D.Sc., Member (National Physical Laboratory).

The Committee of the Section for the present session is as follows:—

Chairman : *W. J. Picken; *Vice-Chairman :* *T. E. Goldup; *Immediate Past Chairman :* *E. B. Moullin, M.A., Sc.D.; *Ordinary Members of Committee :* C. W. Cosgrove, B.Sc.(Eng.), W. L. McPherson, B.Sc.(Eng.), *A. J. A. Gracie, B.Sc., *Col. G. D. Ozanne, M.C., L. W. Hayes, R. P. Ross, B.Sc.(Eng.), T. A. Kinman, M. G. Scroggie, B.Sc., *G. S. C. Lucas, R. L. Smith-Rose, D.Sc., Ph.D., *J. S. McPetrie, D.Sc., Ph.D., and *R. T. B. Wynn, M.A. *Representatives of Government Departments :* Col. R. Elsdale, O.B.E., M.C., M.A. (War Office), Capt. P. F. Glover, R.N. (Admiralty), N. F. S. Hecht (Air Ministry and Ministry of Aircraft Production) and A. H. Mumford, B.Sc.(Eng.) (Post Office), together with the following *ex-officio* members : The President, the Chairman, Papers Committee and Col. A. S. Angwin, D.S.O., M.C. (Council representative).

Not later than June 6th in the case of the Instrument and Transmission Sections and June 7th in the case of the Wireless Section, any five (but not more than five) members of the Section, being Members or Associate Members of the Institution may nominate any other duly qualified person as chairman, vice-chairman, or ordinary member by delivering such nomination in writing to the Secretary of the Institution, together with the written consent of such person to accept office if elected, but each such nominator shall be debarred from nominating any other person for the same election.

* Retire on September 30th, 1941.

Spark-quenching Resistors

CERAMIC materials that possess the valuable property of non-linear resistance, which rapidly decreases as the applied voltage is increased, are all variants of the same physical composition, consisting mainly of silicon carbide and carbon. One of their several uses is for spark-quenching, alone or in series with a capacitor; in either case the quenching resistor may be placed across the gap or the inductor.

With one exception, analytical solution of equations descriptive of the behaviour of circuits of this kind does not seem possible, but numerical solution in a somewhat generalised form is practicable in all cases with the aid of mechanical evaluation by means of the differential analyser. Representative solutions obtained in this way for a range of examples typical of those encountered in communication engineering, bearing some relation to cases met with in automatic telephone practice, are to be found in a paper released by the INSTITUTION OF ELECTRICAL ENGINEERS.

The research into subsidence transients in resistor circuits of this kind, which this paper represents, has been conducted in the Post Office Engineering Department, research branch, and in the Victoria University of Manchester, Physics Department, respectively by Messrs. A. Fairweather and J. Ingham, who present their results in graphical form suitable for use by designers. Curves of current and gap voltage are reproduced as functions (indirectly) of time.

An analytical solution of the single solvable case is included, together with an experimental check of representative calculations, concluding with a study of the effects of temperature on materials of this type, which may be quickly and permanently changed by heat.

Faults on Machine Tools

Pre-arranged Maintenance Prevents Breakdowns

By E. W. Jones

Common troubles with the electrical drive of machine tools are dealt with and suggestions are made for dealing with them or anticipating them

ELECTRICAL maintenance is of the first importance in enabling machine tools to give continuous productive output, and the operators of these machines know the value of efficient electricians. It is hoped that the following notes based on experience may be of help to those engaged on this work.

Dealing first with testing for faults. For a four-wire supply with earthed neutral, the most popular outfit is the 230-V test lamp, either filament or neon, but both may give deceptive results. If high-rupturing capacity cartridge fuses are used, voltage indications may be obtained between phase and earth although the fuse is blown. This is because the melting of the fine-gauge wire which is run in parallel with the main fuse wire for indicating when the latter has ruptured may cause a carbon deposit round the indicating point making a high-resistance path which provides a false voltage indication. A neon tube will be found to glow from the "dead" end.

It should also be remembered, when testing in a three-phase contactor panel, that the contactor coils are shunted between phases and all three phases can give a voltage indication to earth *via* a blown fuse. Therefore, I suggest the voltmeter as the better method, or the use of a testing set that can safely be applied between phases.

Should a contactor coil burn out, there is probably a delay in finding a manufacturer who will quickly rewind or supply a new coil, since the replacement must be of correct dimensions and ohmic value. Incidentally there are many machine tools of foreign manufacture in this country and the supply of spare parts for such items as contactor and solenoid coils, special delay relay equipment, micro and mercury switches, thermal heater coils and vacuum tubes is likely to be limited.

Correct Contact Tension

The first sign of a defective contactor is chattering, caused by loosened screws, faulty retaining contacts, obstruction on main contacts, or incorrect tension, which is the most difficult to correct. A safe way to determine correct contact tension is to tend to close the contactor by hand to a point where the moving contacts touch the fixed, noting at this point the distance between the magnetic pole faces—this should be half the distance left for further contact movement.

The contacts themselves should not be disturbed unless absolutely necessary ; filing should also be avoided, as an electrically bedded surface, if sparkless, is far better before filing than afterwards. All that is necessary is to remove side burrs with perhaps a smooth file or emery cloth. So, providing the making and breaking contact is simultaneous, and the fixing screws fitted with spring washers are tight, perfect operation can be expected. A drop of oil on all moving parts is an advantage, but beware of leakage of oil or coolant into the contactor panel. Oil or grease of any kind is a great enemy to rubber and a number of other insulating materials; for this reason gaskets should be fitted under inspection covers.

Frequent attention should be given to the commutators of DC motors. A smooth, even surface is essential to prevent sparking and undue wear. Each brush or set of brushes should be under similar tension. Brush vibration can cause serious commutator trouble, and may be due to high segments, high mica or grooves and ridges on the commutator; unevenness of the commutator can be responsible for brush vibration, especially where machines are running at high speeds. Brushes should not be tight in holders and brush tails must not be allowed to impede their movement.

Excessive clearance in holders is as harmful as too little, and is liable to cause undue vibration. In regard to the renewing of brushes, if possible not more than one-fourth of the complete set should be changed at one time, so that a number of old brushes will be left to collect satisfactorily, while the new brushes are bedding themselves in.

Guarding Against Oil and Dust

Motors of the open ventilated type driving precision-grinding and thread-grinding machines, where an abundance of coolant is used, sometimes fail owing to the accumulation of oil, ground particles and carbon dust. Machines for such duties should be totally enclosed. Deeply under-cut commutators working under these conditions may soon break down, due to shorted segments. Spaces between segments should be filled with a mixture of mica dust and shellac. Both front and back edges of brushes must be correctly bedded down on the commutator and in line. The commutator should present a dark polished surface.

With regard to control gear for DC, I have known cases in which limit switches with the ordinary type of make-and-break contacts were expected to interrupt the armature current. These had a short life, but relays connected in the circuits provided a means of correcting the difficulty, leaving the limit switches to control coil current only.

In electrical hydraulic systems, where the solenoid coil controls the entire hydraulic pressure, oil pressure is transferred by copper or brass tubes to the cylinder heads, the pistons of which are attached to moving machine parts, such as the table traverse and wheel-head cross traverse. The pressure values in the tube lines are controlled by the solenoid which is energised by a limit or mercury switch, for instance, and the length of table traverse is governed by the distance between two such switches to control the value of inlet pressure on each side of the traversing cylinder. The failure of the solenoid coil can be frequent, unless the electrician is careful to note a few essential points before leaving the machine to its duties.

The principal drawback in the electric-hydro system is that a fault in the pressure line can break down the coil, *e.g.*, when sluggish valve operation prevents the plunger or armature being drawn right home. In other words, an air gap exists, heat is generated, and the coil insulation suffers.

Adjustment of Solenoids

It is most important that valve and armature should have freedom of movement without undue tension. Solenoid failures are more prominent in new machines, probably because the adjustment necessary has been omitted, or perhaps not thought to be needed; for example, before the coil can be expected to be efficient in performance, the armature must be in such a position (normally "off") that the effective part is within the magnetic field, otherwise the current passed in attempting to lift the armature into its field is excessive. There is usually ample latitude of movement in valve operation and it is, therefore, easy to shorten the length of plunger stroke to gain the desired point.

This type of coil is sometimes wound with two distinct gauges of wire, for use on different voltages. It is good practice to make a note of the ohmic value of a good coil, which would provide useful data when rewinding is necessary. Brake coils are usually of the solenoid type, connected in star. Care must be taken when connecting, to note that the lead and return of each coil are in sequence, as a reversed connection will almost certainly cause a burn-out.

The solenoid-operated brake often develops a high-pitched hum, although everything else appears to be normal and the coils cool, which proves the air gap to be negligible; the mechanical operation seems to be perfect in every respect and difficulty has been experienced in tracing the cause. Thorough examination will almost certainly show that the strip copper or brass, embedded across the laminated pole pieces for the purpose of impeding residual magnetism, is loose, and vibrates. Spring washers should be used on brakes, even on terminal connections, as the unit is subjected to excessive vibration.

Magnetic Blow-outs

In recent years, what is known as the plugging relay seems to be preferred to the magnetic brake, and this brings the magnetic blow-out into consideration. I should advise special inspection of the blow-out equipment in all cases. I believe the maintenance electrician tends to give this matter too little attention and so is often called to renew contacts, whereas, had the blow-out functioned correctly, the contact failure would have been averted. The means of testing this is simple : Get a piece of iron and insulate it, then apply it to the pole face with the switch engaged. A slight magnetic pull should be felt, which will increase as the current increases. The magnetic field so produced is responsible for breaking the arc, and so prevents burnt contacts. The components of this unit are easily shorted out, either by the arc itself, or by tracking from the effect of it.

To conclude : the electrician will be wise to impart a little essential information to machine operators. Explain the possibility of extensive damage likely to be caused by the motor or valve not responding to the start button, for instance. Point out that the contactor concerned may have partially closed and wedged, or that the motor may be single-phasing. Emphasise the necessity of isolating the machine at once in such cases and of calling in the electrician.

Testing Heavy-current Meters

Comparison with Check Meters on Site

By G. W. Stubbings, B.Sc., A.M.I.E.E.

THERE are three methods whereby a meter in service may be checked for accuracy. First, it may be removed and dealt with in the test house. Secondly, it may be checked on site by artificial loading in the usual way. Thirdly, the advance of the meter over a period of actual service may be compared with the corrected advance of a calibrated meter connected in the circuit.

Each method of checking has its advantages and drawbacks. The first method is most accurate, but the removal of the meter may alter its errors, so that the result of the test does not represent the actual performance of the meter before it was removed. The second method is generally troublesome, and often impracticable with heavy-current meters. The third method does not give a complete accuracy characteristic of the meter, but only its overall average error at one average load. It is, however, the easiest and most convenient method of testing on site, and it has the further advantage that the test can be checked by the consumer if he so desires. Further, if a starting-current test of the meter can be made in addition to the comparison check, and the results of both of these tests are satisfactory, then the performance of the meter may be inferred with fair safety to be accurate over the whole of its normal working range.

Meters measuring large supplies are usually of the three-phase type with current transformers. A comparison check may be made in two ways. The most conclusive is to connect in the main circuit of the meter a set of substandard current transformers for the supply to the check meter. If the accuracy characteristics of the check meter and of the substandard current transformers are known, then the true kWh consumption corresponding to an observed advance of the permanent meter can be calculated without difficulty. To do this, the average load and the average power factor over the testing period must be known. The true average power factor can only be determined if a second check meter measuring the reactive consumption is installed, but a sufficiently good approximation to the average power factor can be obtained by comparing the advance of the permanent meter over a short period with the advance of the check meter with the voltage connections to its red or weak element reversed, over a similar period.

After studying various testing methods the author advocates the provision of an auxiliary current transformer winding for facilitating tests

Provided the three-phase load is not very unbalanced, $\sqrt{3}$ times the advance of the check meter give an approximate value of the kVArh corresponding to the kWh hour advance of the permanent meter, and the ratio of kVArh to kWh gives tan ϕ, from which cos ϕ, the power factor, can be determined. The kWh advance of the check meter divided by the working time of the check gives the average kW, and from this and the power factor, the average current at which the check meter operated can be found. From this data the inherent error of the check meter and the ratio and phase errors of the substandard current transformers can be determined.

The registration error fast caused by the substandard current transformer errors is equal to $r + \alpha \tan \phi$ where r is the known percentage ratio error and α the known phase error in centiradians. Thus the advance of the check meter can be corrected and the true kWh consumption obtained. It is useful to remember that the centiradian measure of a current transformer phase error is very approximately 3 per cent. of its measure in minutes of angle.

Calculating True kWh Consumption

If the error characteristics of the permanent current transformers are known, then the true kWh consumption corresponding to an advance of the permanent can be similarly calculated from the corresponding advance of a check meter with its current coils connected in series with those of the permanent meter in the secondary circuits of the permanent current transformers, provided that the extra burden on these transformers caused by the connection of the check meter does not alter the errors with constant primary current. The VA burden of a watthour meter is so small that this may be fairly assumed to be the case for all but very poor current transformers. The procedure, with this method of checking, will be precisely the same as when substandard transformers are installed.

If a check is carried out on an AC meter by installing substandard current transformers for the check meter, the ratio and phase errors of the permanent current transformers in the test conditions of loading can be found without much difficulty. This point is of considerable practical importance, because, if the permanent transformer errors have not been initially found, but can be determined by a simple test on site, then in future very approximate checks of the permanent meter under similar conditions of loading can be made without installing the substandard current transformers.

The permanent transformer errors can be found in the following way. Corresponding advances of the permanent meter and the check meter are obtained with the check meter energised by the substandard current transformers, and the percentage difference between these advances is found. The check meter is then connected with its current coils in series with those of the permanent meter, and a second comparison is made, and a second percentage difference between the two advances is found.

These percentage variations will usually be different, owing to the difference of the errors of the substandard transformers that energised the check meter during the first check and the permanent transformers that energised it during the second. Let this difference of the two percentages be reckoned positive if the check meter was faster when connected to the permanent current transformers. Then calling this difference C_1, it is clear that $C_1 = r + \alpha \tan \phi$, where r and α are respectively the differences between the unknown ratio and phase errors of the permanent transformers and the known errors of the substandard transformers. The actual values of the differential ratio and phase errors, r and α can be found by making two power factor tests, one with the reversed phase substandard connected first to the substandard current transformers, and then to the permanent transformers. Let the advances of the reversed phase meter be compared for exactly the same advances of the permanent meter registering kWh. The percentage difference, C_2, between the advance with the check meter connected to the permanent transformers and to the substandard transformers will be equal to $r - \alpha/\tan \phi$, so that $C_1 - C_2$ is equal to $\alpha \left(\tan \phi + \frac{1}{\tan \phi}\right)$ and, as tan ϕ is known α and r can be determined.

This calculation may be further elucidated by a simple numerical example. Suppose that over a sixteen-hour working run the advances with the check meter connected to the substandard transformers are 1511 for the permanent meter and 1531 for the check meter. The percentage difference is 1.31. Let the advances with the check meter energised by the permanent current transformers be 1480 for the permanent meter and 1515 for the check meter. The percentage difference is 2.31. The check meter is thus 1.0 per cent. faster when connected to the permanent transformers, and this is due to the difference between the errors of these and the errors of the substandard transformers.

Suppose that the advances of the reversed phase check meter for a 50 kWh advance of the permanent meter are 29.05 when connected to the substandard transformers, and 28.78 when connected to the permanent transformers. The reversed phase check meter is 0.93 per cent. slower when energised by the permanent transformers, and this is due to the differential errors.

Further, as the kVAr corresponding to the 50 kWh advance of the permanent meter are $\sqrt{3} + 29.05$, tan $\phi = 1.01$, and the power factor is 0.7. Substituting the numerical values in the formulæ of the preceding paragraph $C_1 = 1.0 = r + 1.01\,\alpha$ and $C_2 = 0.93 = r - \alpha/1.01$, whence $C_1 - C_2 = 1.93 = \alpha\,(1.01 + \frac{1}{1.01})$ and $\alpha = 0.96$ centiradian and $r = 0.04$ per cent. If the rated current of the permanent transformers is 500 A, then as the average kW are 96 at a power factor of 0.7, the average current at 400 V is 343 A. The values of r and α therefore give the differences between the errors of the transformers at a current of 68 per cent. of the full-load current of the permanent transformers.

The whole matter of checking on site would be very much simplified if a suggestion, made some years ago, for protective current transformers were adopted for metering transformers. This is to provide all current transformers with an auxiliary 5-A primary winding, which is normally kept open-circuited. If metering current transformers were equipped with such an auxiliary winding, complete and conclusive on-site tests of the overall accuracy of meter a three-phase metering equipment could be carried out during periods of non-working hours, by artificial loading, using the auxiliary 5-A winding as the primary circuit.

Artificial tests loads up to 5 A can be obtained with easily portable gear, and a check carried out in this way could include not only a test of the permanent meter over the whole working range, but also full VA tests at artificial power factors of 0.5 lagging and leading, by cross-phasing the artificial load connections.

COMMERCIAL and INDUSTRIAL NEWS

Benevolent Association Luncheon. R.A.F. Calls for Electricians.

I.M.E.A. Council Nominations

WE stated last week that the annual meeting of the Incorporated Municipal Electrical Association at York on June 12th would be preceded by an extraordinary general meeting for the purpose of amending the articles of association.

It has been represented to the Council that as the elections of certain local authorities normally take place early in April, the period for nominations by representatives of members should, if possible, not expire until after the elections have been held. It is consequently proposed that the period should be extended from five weeks after the date of circulation of the Council nomination list to six weeks.

Other amendments are proposed to secure that all nominations (by Council and representatives of members) shall be based on the same financial year; to clarify the expression "representative of a member"; to ensure that an ordinary member of Council shall serve his full term although he may become a representative of a member other than the one he originally represented; to make it clear that the Council may nominate more persons than there are vacancies to be filled; and to provide for the calculation of the subscription of a member upon the number of kWh sold during the financial year of the member which ended in the calendar year immediately preceding the date upon which the subscription is payable. In the case of a new member elected in the first quarter of a year the figure will be the number of kWh sold during the member's financial year which ended in the last but one calendar year preceding the date of election.

E.I.B.A. Luncheon

We have received further particulars of the annual luncheon reunion of the Electrical Industries Benevolent Association, which is to be held on June 17th at the Connaught Rooms, Great Queen Street, London, W.C.2. In addition to Mr. H. S. Fothergill, the secretary, tickets (7s. 6d. each), can be obtained from Mr. J. N. Stephens, chairman of the Association, Crown House, Aldwych, London, W.C.2, or from Mr. J. J. Conlan (B.E.A.M.A.), 36, Kingsway, W.C.2. Seating will be at tables of eight, and parties can be arranged on application to Mr. Conlan (telephone: Holborn 0502), who will also supply any further information.

As we have already announced the luncheon will be preceded (at 12 noon), by the annual meeting of the Association.

Electricians for the R.A.F.

Skilled men in certain electrical and mechanical trades who have hitherto been reserved are now permitted to volunteer for the Royal Air Force. The classes involved are electrical fitter (general hand); electrical machinery erector; maintenance electrician, electrical engineering maintenance; tester inspector, electrical apparatus or machinery; fitter assembler, electrical engineering; electrical fitter (general hand); cable jointer (cable repairer) (high tension); overhead linesman (not tramway); overhead wireman; magneto maker, assembler.

Is a Kitchen a "Factory"?

In our issue of September 5th last, we reported an action for damages brought against the London County Council by Miss Marjorie Wood, a kitchenmaid at the Bexley Mental Hospital, who seriously injured one of her hands while operating an electrically driven mincing machine. It was maintained on her behalf that the Council had been negligent in failing to fence the machine as required by Section 14 of the Factories Act, 1937. The L.C.C. denied negligence and pleaded that there had been contributory negligence on the plaintiff's part.

Mr. Justice Tucker held that the premises came within the scope of the Act and therefore the machine should have been guarded, but he also decided that Miss Wood had been guilty of contributory negligence and gave judgment in the Council's favour.

Last week Miss Wood appealed against this decision but the Court of Appeal dismissed the appeal, finding that there had been contributory negligence on her part. In giving judgment, moreover, Lord Justice MacKinnon held that a kitchen was not a "factory" within the meaning of the Act, even if it were carried on in a large way for commercial gain. If a kitchen were to be regarded as a factory extraordinary results would follow, having regard to the many requirements of the Factories Act.

London's War Weapons Week

This week is London's War Weapons Week and we have received from the Lord Mayor (Sir George Wilkinson) an appeal that everybody living or working in the City will co-operate in raising a record sum for this very vital purpose. We are reminded that there are forms of investment suited to all circumstances and pockets—2½ per cent. National War Bonds, 3 per cent. Savings Bonds, 3 per cent. Defence Bonds, National Savings Certificates, the Post Office Savings Bank and Trustee Savings Banks.

Emergency Heating of Hospitals

The many auxiliary hospitals, first-aid posts, etc., now being established provide an interesting problem for the heating engineer. Not only is speedy installation an essential feature but there are often situations to be catered for which are partially open to the outside air. A satisfactory solution is to be found in the employment of reflector fires mounted on the walls and Ferranti, Ltd., who specialise in this type of apparatus, have already supplied a considerable number of these units for first-aid rooms for factories, supply authorities and private customers as well as for hospitals and sanatoria.

Ferranti wall type reflector fires installed in an emergency first-aid room

Registration of Storage Space

As we reported last week, under the Storage Facilities (Information) Order, 1941, made by the Board of Trade (S.R. & O. 1941 No. 641) owners of premises situated in Great Britain of which the floor area is 3,000 sq. ft. or more, and which have at any time since January 1st, 1938, been used for the purpose of storing goods of any kind whether or not they are now being used for storage or other purposes, is required to give certain information about these premises. Owners of such premises should, therefore, apply as soon as possible either to their local Chamber of Commerce, any office of the Federation of British Industries; any office of the National Union of Manufacturers; or the Registrar of Factory and Storage Premises, Board of Trade, Millbank, London, S.W.1, for a form of return. This form must be returned completed to the Registrar on or before June 2nd. Several classes of storage premises are excepted from the provisions of the Order, including garages; premises used mainly in connection with a factory and situated within one mile from that factory; premises in respect of which a "return of factory premises" has already been made; premises owned by local authorities and most public utility undertakings, etc. There is at the moment a very heavy demand for storage space and the information made available by this return will enable the Controller-General of Factory and Storage Premises to assist Service and Supply Departments in dispersing essential stocks.

Fire-watching Dispute

At Bath last week five employees of the Electricity Department were summoned for refusing to undertake fire-watching duties at the electricity works. It was stated that the defendants, none of whom was exempted, consistently refused to perform the duties allotted to them under a scheme worked out between the management and employees.

The defendants' case was that compliance would subject them to undue hardship and they asked that the matter should be referred to the Electricity Commissioners for their decision. The magistrates therefore adjourned the case until the Commissioners had been consulted.

Past Volumes Available

One of our readers tells us that he has for disposal copies of the ELECTRICAL REVIEW dating from 1901 to 1933. It is possible that other readers may be in need of these and we shall be glad to pass on their names to our correspondent.

Inquiries for Domestic Apparatus

A Cork firm wishes to get into touch with electric cooker manufacturers, particularly those producing small portable units, grill boilers, breakfast cookers, etc.

British makers of food mixers of American type are requested by a Reykjavik, Iceland, firm to get into contact with it. We shall be pleased to forward correspondence from anyone interested.

Care and Maintenance of Apparatus

In view of the Limitation of Supplies Act and the consequent difficulty in obtaining new

apparatus, it is very necessary that housewives should know how to make the best use of their existing apparatus. The Electrical Association for Women suggests that demonstrators might find that they can make a very practical contribution to the war effort and one which would be of the greatest possible assistance to the housewife if they would introduce some short and simple lecture-demonstrations on the care and maintenance of domestic electrical apparatus. Such a talk could follow a short cookery demonstration, or the whole time might be devoted to a piece of apparatus, the care of flexibles, etc.

Export Control

The Board of Trade has issued the Export of Goods (Control) (No. 19) Order, 1941 (S.R. & O. 1941, No. 630), the chief effect of which is to consolidate previous export control Orders. The new Order, which came into force on May 15th, sets out the position with regard to export licensing control on that date.

Trade Announcements

J. J. Eastick & Sons, Ltd., have decided to make their temporary address at 12, Errol Street, London, E.C.1, permanent for the duration of the war. The telephone numbers are Kelvin 4706-8. Small stocks are now being kept at 1, Marina Grove, Copnor, Portsmouth.

Changes of Address

Willmott, Son & Phillips, Ltd., have moved to "Aveco" Works, 52A, Blackstock Road, Finsbury Park, N.4 (telephone: Canonbury 3062).

F. C. Heayberd & Co. have moved to 28 Russell Square, London, W.C.1 (telephone: Museum 1098).

Batteries for the Deaf

The Board of Trade announces that arrangements have been completed for the manufacture of an adequate supply of high-tension batteries to meet the needs of deaf persons who use hearing-aids. In general, it will be found that the new batteries are rather larger than those formerly in use, but every endeavour has been made to ensure that alterations to instruments, where necessary, shall be of a minor character and confined to the battery casing only. No modifications will be required in the mechanism of any instrument.

New Catalogues and Lists

British Thomson-Houston Co., Ltd., Crown House, Aldwych, London, W.C.2.—Leaflet L.712 dealing with "Mazda" bulbs for miners' cap lamps and hand lamps (gasfilled).

Watson & Sons (Electro-medical), Ltd., 76 Castle Street, Reading. — An illustrated brochure describing the new type MX-2 portable X-ray apparatus.

Thos. W. Ward, Ltd., Albion Works, Sheffield.—A leaflet describing a new platform truck suitable for warehouses, foundries, stores, etc.

Fisher Deane Engineering Co., Ltd., 17, Victoria Street, London, S.W.1.—A brochure describing the use of cellulosic waste (wood shavings, sawdust, etc.), for steam raising.

Control of Mercury

The Ministry of Supply announces that the Control of Mercury (No. 5) Order of February 13th, 1941, has been amended by the Control of Mercury (No. 6) Order (S.R. & O. 1941, No. 586, price 1d.), which came into force on May 3rd. Under the new order, maximum selling prices of mercury metal, which has not hitherto been subject to price control, are now fixed. The maximum price for quantities of over one bottle (79 lb.), but less than eleven bottles is £48 15s. per bottle, and for larger quantities, £48, ex sellers' premises in both cases. There are higher prices for lots of under one bottle and for redistilled grades.

The Ministry is prepared to sell quicksilver (commercially pure virgin mercury) to approved buyers and applications should be made to the Raw Materials Department (Mercury Control), Ministry of Supply, Warwick. Inquiries for quantities of less than eleven bottles, should continue to be made to mercury dealers. The mercury will be sold until further notice by the Ministry at £47 15s. per bottle ex warehouse in the United Kingdom.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

INCENDALARM fire warning system.

TRADE MARK APPLICATIONS

AMONG recent applications for British trade marks are the following, objections to which may be entered within a month of May 14th:—

REY-RACK. No. 614,303, Class 9. Racks for supporting electric cables and other electrical apparatus. A. Reyrolle & Co., Ltd., Hebburn-on-Tyne.

ELEKTRON. No. 612,732, Class 11. Lamps, lighting installations and fittings, heating fittings, fans, cooling apparatus, dust removing installations, freezing machines, etc., and their components. Magnesium Elektron, Ltd., Abbey House, Baker Street, London, N.W.1.

ENORPRENE. No. 613,728, Class 17. Electrical insulation parts, electrical insulation material, electrical insulators, insulating gloves, jointing packages, etc. North British Rubber Co., Ltd., Castle Mills, Fountain-bridge, Edinburgh.

ALCOMAX. Nos. 613,680/74996S. Magnetic metals and alloys thereof, all being common metal unwrought or partly wrought. Swift Levick & Sons, Ltd., Clarence Steel Works, Leveson Street, Sheffield.

Information for Contractors

Associations' Advice to Members

PART II of the Schedule of Reserved Occupations and Protected Work gives particulars of the classes of undertakings which the Minister of Labour and National Service is prepared to consider for admission to the Register of Protected Establishments. This affects the "reserved" age of employees in an industry. Apparently there has been some doubt as to whether electrical contractors engaged on work of national importance should apply for registration under Group 2 ("Establishments or branches of establishments wholly or mainly engaged on Government work") or Group 4 ("Works of building or construction of classes certified as of national importance by the Minister of Labour and National Service, after consultation with the Minister of Works and Buildings").

The National Federated Electrical Association has advised its members who possess the necessary qualifications to secure registration to get into immediate touch with the local office of the Ministry of Labour, explain exactly the work upon which they are engaged, and fill in Form N.S.168 (for Group 2) if they are advised to do so. But whether this form is completed or not, Form N.S.169 (for Group 4) should also be submitted when it is available.

Apprentices and Military Service

The Ministry of Labour and National Service has decided that in connection with the calling-up of the 19-year-old age group for military service, arrangements will be made for the deferment of the calling-up of apprentices in essential trades until the completion of their apprenticeship or until they attain the age of 20, whichever is the earlier.

Application for deferment must be made by the apprentice and his employer jointly and must relate to a man under a regular apprenticeship for a term of years, whether under indentures, written agreement, or by arrangement between the parties in accordance with the custom of the occupation; oral agreements are not excluded. The N.F.E.A. says that this is not intended to apply to casual boys or "learners." In the absence of legal indenture there must be reasonable evidence that there exists a definite contract in writing or orally and that the apprenticed lad is being employed for a definite number of years.

Deferment will only be allowed where the occupation for which the man is being trained is of first importance to the war effort, which in general means the occupations for which the age of reservation is and remains 25 or under. The appropriate form of application, obtainable from local offices of the Ministry of Labour, is N.S.178.

War Risks Insurance

The attention of members of N.E.C.T.A., Ltd., is drawn to amendments of the War Risks Insurance Act, 1939, made by the War Damage Act, 1941. Hitherto electrical contractors were obliged to insure stocks which they held on their own premises and in transit. Now contractors are being required to insure installation material up to the time it is fixed to, and becomes the property of, the person for whom the installation is being carried out.

Thus if a contractor gives an unconditional order to his suppliers he is required to carry the risk from the time of the contract of purchase until the material is delivered and installed. By inserting in the order form a clause suggested by N.E.C.T.A., however, the contractor can avoid liability until the goods are delivered to his premises or the site of the contract.

Whitsun Holidays

The Government's decision not to cancel the Whit Monday Bank Holiday, although work will not be suspended on Whit Tuesday, raises the question of payment for these days. The N.F.E.A. states that so far as the electrical contracting industry is concerned, Whit Monday is a Bank Holiday and if work is done on that day time-and-a-half is payable. The same condition applies to the August Bank Holiday, although the Government has as yet made no announcement regarding that day. Whit Tuesday, is a holiday in Bristol, Derby and Sheffield and all hours worked in these districts must, in accordance with the agreement, be paid for at the rate of time-and-a-half.

ELECTRICITY SUPPLY

Metropolitan Water Board's Scheme. L.C.C. and Voltage Control

Banstead. — SHELTER LIGHTING. — The Urban District Council is submitting schemes for the permanent electric lighting of public shelters to the Regional Commissioners for approval.

Barrow-in-Furness.—RURAL NETWORK RECONSTRUCTION.—The Electricity Committee has obtained sanction to borrow £25,650 in connection with the reconstruction of the rural network.

Birkdale.—TRANSFER OF UNDERTAKING.—As a wartime measure, a special committee of five has been appointed by the Town Council to deal with matters arising in connection with the taking over of the electricity undertaking of the Birkdale District Electric Supply Co.

Bootle.—SHELTER HEATING.—The Corporation Emergency Committee reports that approval has been given to the provision of electric heating in shelters and four are to be equipped with tubular heaters for trial purposes.

Bournemouth.—EMERGENCY LIGHTING.—Tenders are to be obtained by the Corporation Assistance Committee for emergency lighting at the institution.

Bradford. — HOSPITAL EQUIPMENT. — The Corporation Health Committee is to purchase a portable electro-cardiograph for St. Luke's Hospital at a cost of £214.

Carlisle.—HIRE AND HIRE-PURCHASE.—The Corporation Electricity Committee has obtained sanction to utilise £5,000 from the net surplus for the hire and hire-purchase scheme.

Dalbeattie.—STREET LIGHTING SUSPENDED.—In view of the alarm and fears expressed by the general public that the recently introduced modified street lighting might act as a guide to enemy aircraft, the Town Council has decided to suspend the scheme. The Provost has stated, however, that personally he did not believe that the street lights could be seen by aeroplanes flying at a height.

Darlington. — LOAN SANCTIONED. — The Town Council is applying to the Electricity Commissioners for sanction to borrow £4,032 to cover the cost of supplying electricity to a large local consumer.

RECTIFYING CONDENSATION DIFFICULTIES.—To meet complaints regarding condensation of vapour from the cooling towers of the electricity works, certain alterations are contemplated by the Town Council. The descent of the vapour varies according to the humidity of the atmosphere, and it is hoped that as a result of plans being considered by the Gas, Electricity and Transport Committee, there will be no cause for complaint in future.

Douglas (I.O.M.).—MAINS EXTENSIONS.—The Corporation Electricity Committee is to extend mains at a cost of £310.

Dover.—LOAN FOR SERVICES.—The Town Council has received sanction to borrow £500 for services.

ELECTRICITY CHARGES.—The charge for electricity for lighting has been increased to 4½d. per kWh, and the discount of ½d. a kWh for prompt payment has been abolished.

Dukinfield.—SUPPLIES TO JUBILEE HALL.—In order to achieve a reduction in lighting costs, the Town Council proposes to rearrange the installation in the Jubilee Hall.

Gateshead.—HOSPITAL INSTALLATIONS.—The Town Council has received consent from the Ministry of Health to borrow £3,868 in respect of electrical plant at the Sheriff Hill and General Hospitals.

Glasgow. — SHELTER LIGHTING. — Electric lighting has now been installed in 778 public shelters.

FIRE BRIGADE INSTALLATION.—The Corporation Police Committee has arranged for the Electricity Department to install electric lighting, telephones, etc., at the fire brigade control room at a cost of about £1,000.

Guildford.—SUPPLIES TO HENLEY PARK.—The Rural District Council is to raise no objection to applications from the Guildford Corporation and the Mid Southern Utility Co. for permission to erect overhead lines.

Hailsham.—FRINGE ORDER.—The Rural District Council is to raise no objection to a proposal of the Eastbourne Corporation to apply to the Ministry of Transport for a Fringe Order to supply electricity to two sites at West Dean.

Lichfield.—CONSUMERS' APPARATUS.—The Corporation Electricity Committee has obtained sanction to borrow £1,000 for consumers' apparatus.

London.—SAFEGUARDING THE WATER SUPPLY.—The Metropolitan Water Board is to provide further plant for emergency protective works. This includes centrifugal pumps, Diesel and turbine driven alternators and boiler plant. A further proposal is for the connection of the Board's works to the grid system in order to provide additional standby power and the proposals for additional plant embody transformers and rectifiers to enable the mobile electrical plant to be driven. The estimated cost of furnishing such supplies as could be used by standard transforming machinery is £16,000. To ensure a sufficient flow of water into the intakes in the event of damage to weirs electrically driven pumps mounted on shallow draft barges are to be provided. The estimated cost of two such barges, each carrying four electrically driven pumps with an aggregate capacity of 50 million gallons daily, inclusive of piping and supporting barges, is £12,500. The electrical energy would be supplied by the Board's existing mobile generators.

VOLTAGE TESTING STATIONS.—The L.C.C. Public Control Committee report that stations for testing the pressure of supply of electricity have been established throughout London and records are taken under seal by the electric inspectors. Faulty pressure is brought to the notice of the undertakers with the object of ensuring to the consumers a supply of electricity at a pressure within the statutory limits. In all, 64 records, each extending over a period of one week, were taken during the past quarter.

Under the provisions of the London Electric Lighting Orders, 56 electricity meters, the accuracy of which was disputed, were tested at the Council's testing station. Of this number, 39 were found to be correct, 15 over-registering and 2 under-registering. In addition, electricity undertakers submitted 1,118 meters for verification in accordance with instructions of the Electricity Commissioners.

PUMPS FOR SHELTERS.—The L.C.C. Emergency Committee is to purchase thirty-five automatic electric pumps at a cost not exceeding £15 15s. each for estate air raid shelters.

FULHAM.—The Borough Council Works and Highways Committee recommends the purchase and installation of an electric motor for driving the asphalt plant at the refuse destructor at a cost of £221.

Manchester.—LOAN APPLICATION.—The City Electricity Committee is seeking borrowing powers for £10,000 to meet expenditure to complete schemes on hand, equip new distributing stations and provide for increased transformer capacity at various distributing stations.

Mansfield.—LOANS SANCTIONED.—The Corporation Electricity Committee has obtained sanction to borrow £2,500 for mains and services and £700 for plant.

Nelson.—BULK SUPPLIES.—The Corporation Electricity Committee has considered a letter from Barnoldswick Council regarding a bulk supply to Barnoldswick. The Town Clerk was instructed to obtain counsel's opinion on the subject and chairman and officials were authorised to interview the Electricity Commissioners.

The Committee also considered a letter from Earby Council regarding an account for bulk supply of electricity for the year ended December 31st, 1940. In view of the special circumstances Earby District Council was allowed a rebate of £120.

Pontefract.—MORTUARY SUPPLY.—The Corporation is to install electricity at the mortuary in Headlands Road.

Smethwick. — LIGHTING OF SCHOOL SHELTERS.—The Corporation Education Committee is to have electric lighting installed in school shelters.

Stoke-on-Trent.—INQUIRY.—An application by the N.W. Midlands J.E.A. was the subject of an inquiry recently opened at the Town Hall. The inquiry was conducted by Mr. J. M. Kennedy, deputy chairman of the Electricity Commission, and Sir Leonard Pearce. The objections were by private individuals who alleged that the proposal, if effected, would injure residential amenities and depreciate property. Witnesses for the proposal said that amenities would not be injured to the extent envisaged by the objectors.

Sunderland.—BATTERY CHARGING PLANT.—The Town Council is to purchase a battery charging plant for the Fulwell sub fire station at a cost of £140.

Swindon.—SWITCHGEAR AND CABLE.—The Corporation Electricity Committee is to obtain quotations from the British Thomson-Houston Co., Ltd., for auxiliary switchgear and main and auxiliary cable, and from the Hackbridge Electric Construction Co., Ltd., for transformers.

Tonbridge.—MONTHLY BILLS FOR LARGE CONSUMERS.—Monthly accounts for electricity are already being rendered to a number of consumers. The list is now being extended by the Urban District Council Electricity Department to cover ninety-eight large consumers, including factories, schools, cinemas, licensed premises and stores.

Tynemouth.—RESTAURANT INSTALLATION.—The Town Council has approved the expenditure of £1,788 on equipping the Jubilee Restaurant, including the installation of a lift.

Uckfield.—UNDERGROUND CABLE.—As the Weald Electricity Supply Co. now proposes to lay the cable underground at Tophill, Withyham, for the greater part of the whole length, the Rural District Council has notified the company that it does not desire to be heard by the Minister of Transport before he gives his consent to the proposal.

Walsall.—TRANSFORMERS.—The Corporation Electricity Committee is to purchase three 500-kVA transformers at an estimated cost of £1,200.

Worksop.—ELECTRICITY FOR HAWK'S NEST HILL.—An application has been received by the Town Council for a supply of electricity to the Hawk's Nest Farm and adjacent premises.

Overseas

Argentina.—POWER PLANT'S VICISSITUDES.—Just before the outbreak of the war it was decided to increase the plant capacity at Mar del Plata from 10,000 to 14,800 HP and an order for the turbo-generator plant was placed in Switzerland. War came and with it the problem of transport. The French would not allow the shipment of the parts by way of French ports as French railways had enough to do. Italy came to the rescue and the machines were despatched by way of Genoa. But when Italy entered the war she, too, put a stop to the shipments and for some months nothing was done.

After the collapse of France the Swiss Government tried again. This time the French were willing and the machines were shipped via Marseilles. In order to cut down risk the plant was taken by United States boats to New York and then transhipped to Buenos Aires. Thus the work took twice as long as it should have done, but it has now been completed.

Australia.—LINKING-UP SCHEMES.—Work is to proceed immediately with the plan to link up the power stations of Sydney and Newcastle. This will be effected by connecting the substations at St. Leonards, North Sydney, and the Zara Street power station at Newcastle. Permission has been granted by

the Commonwealth Government for the New South Wales Government to carry out the work on a 66,000 V line at an estimated cost of £126,000. Plans have already been prepared by the New South Wales Government to construct a 66,000 V transmission line between Port Kembla and Sydney at an estimated cost of £93,000.

Canada.—NEW BRUNSWICK PROPOSAL.—Legislation authorising the city of Saint John, New Brunswick, to negotiate for the purchase of the New Brunswick Power Co.'s distribution system and to hold a plebiscite on the matter will be introduced during the present session of the New Brunswick Legislature.

HYDRO-ELECTRIC DEVELOPMENT IN QUEBEC.—The first Provincial hydro-electric plant in Quebec Province, the 64,000-HP station on the Upper Ottawa River above Rapids No. 7, will come into operation on August 1st this year, when it will supply 16,000 HP to the Noranda Mines in Northern Quebec. Mr. Olivier Lefebvre, vice-chairman of the Quebec Streams Commission, who is in charge of the scheme, made this announcement recently and said that the installation of three turbines of 16,000-HP capacity was being completed on the project. A fourth will be installed soon. Besides supplying power to Noranda, it is intended to extend the advantages of the electricity developed on the Upper Ottawa River over as wide an area as possible in Quebec's northern mining district. The dam, which was started in 1938, is 1,100 ft. high and comprises 1,800 ft. of earth and 1,200 ft. of cement.

India.—MYSORE.—The report of the Mysore Electrical Department for the year 1939–40 shows that the total energy generated was 278.3 million kWh, as compared with 252 million kWh in 1938–39 and 238.6 million kWh in 1937–38. The total consumption for the three years was 222.6 million kWh, 207.6 million kWh and 201.4 million kWh respectively. The *per capita* consumption of electrical energy in the State was about 32 kWh for 1939–40, as against 30 kWh in the previous year. The total normal capacity of the Shimsha and Sivasamudram stations, according to *Indian Engineering*, is 69,000 HP and the two stations together can take loads up to 80,000 HP in an emergency. The Shimsha New Project, which is designed to generate 23,000 HP, was completed and the first unit of 11,500 HP was put into regular service in April, 1940, and the second unit in June, 1940.

Turkey.—ELECTRIFICATION PROJECTS.—The *Journal* of the British Chamber of Commerce of Turkey states that the production of electrical power under the republican regime has increased sevenfold and during the last six years the Department of Electrical Development of the Ministry has studied the problem of replacing by electrical power other sources of energy. As a result of its surveys, this Department has concluded that the Sakarya river could furnish 75 million kWh annually, and the first experiments to this end have been made. Further electrical power will be supplied by the river Gediz and the power house, which it is proposed to construct on the Zamanti branch of the river Seyhan.

TRANSPORT

London.—TUBE EXTENSION.—Since last Sunday Northern Line train services have been extended to serve Mill Hill East station (L.N.E.R.) via Finchley Central. The trains run to and from Morden and give a direct West End service up to 7 p.m. on weekdays. After 7 p.m. and throughout Sundays there is a shuttle service between Mill Hill East and Finchley Central.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specifications (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1939

19534. "Electric contacts." G. H. Scholes & Co., Ltd., G. H. Scholes and F. J. Pearce. July 5th, 1939. (535810.)

26256. "Refrigerant evaporators." Buensod-Stacey Air Conditioning, Inc. September 30th, 1938. (535817.)

26346. "Electric valve control circuits." British Thomson-Houston Co., Ltd. September 21st, 1938. (535933.)

26354. "Thermostats." Westinghouse Electric International Co. October 27th, 1938. (535855.)

27069. "Electric oscillation generators." E. L. C. White. October 3rd, 1939. (535778.)

28146. "Electric contact carrier." Aero Engines, Ltd., and P. Sykes. October 18th, 1939. (535820.)

28147. "Electric contact members for detachable elements such as fuses." Aero Engines, Ltd., and P. Sykes. October 18th, 1939. (535821.)

28309. "Electric lampholders and caps." British Thomson-Houston Co., Ltd., J. G. Wellings and W. S. Adams. October 20th, 1939. (535827.)

28310. "Fluorescent materials for use in electric discharge devices." British Thomson-Houston Co., Ltd. October 21st, 1938. (535897.)

28320. "Cooling of dynamo electric machines on aircraft." Rotax, Ltd., and O. Lucas. October 20th, 1939. (535784.)

28332. "Electric lampholders and caps." British Thomson-Houston Co., Ltd., J. G. Wellings and W. S. Adams. October 20th, 1939. (535828.)

28334. "Arrangements for protecting thermionic valve apparatus against lightning discharge or overload." Standard Telephones & Cables, Ltd., and A. J. Maddock. October 20th, 1939. (535785.)

28335. "Telephone subsets." Standard Telephones & Cables, Ltd. (L. J. G. Nys and E. H. L. J. Preud'homme). October 20th, 1939. (535786.)

28336. "Telephone subsets." Standard Telephones & Cables, Ltd. (L. J. G. Nys and E. H. L. J. Preud'homme). October 20th, 1939. (535787.)

28337. "Telephone subsets." Standard Telephones & Cables, Ltd. (L. J. G. Nys and E. H. L. J. Preud'homme). October 20th, 1939. (535788.)

28353. "Operation of motion picture projectors with alternating current supplies for the light sources." C. S. Ashcraft. October 21st, 1938. (535938.)

28373. "Electricity meter changeover devices." M. A. Ramsey. October 20th, 1939. (535830.)

28462. "Refrigerator cabinet construction." Westinghouse Electric International Co. November 2nd, 1938. (Cognate application, 28463/39.) (535899.)

28469. "Operating mechanism for electrical circuit-breakers." Allmanna Svenska Elektriska Aktiebolaget. October 24th, 1938. (535859.)

28480. "Electric signalling systems." Standard Telephones & Cables, Ltd. (Matériel Téléphonique Soc. Anon.). October 23rd, 1939. (535860.)

28491. "Alternating electric current control apparatus." Westinghouse Brake & Signal Co., Ltd., S. A. Stevens and A. H. B. Walker. October 23rd, 1939. (535861.)

28540. "Electric plug-and-socket connections." J. H. Tucker & Co., Ltd., and F. C. Fuke. October 24th, 1939. (535942.)

28594. "Electromagnetic control device." F. H. Fodor. October 24th, 1939. (535903.)

28596. "Tuning devices and indicators for radio receivers." Standard Telephones & Cables, Ltd., and C. N. Smyth. October 24th, 1939. (535904.)

28597. "Time base circuits for television receivers." Standard Telephones & Cables, Ltd., D. S. B. Shannon and P. K. Chatterjea. October 24th, 1939. (535905.)

28598. "Volume compression and expansion in electric signalling systems." Standard Telephones & Cables, Ltd., and C. P. Ross. October 24th, 1939. (535906.)

28599. "Radio receivers and automatic gain control arrangements therein." Standard Telephones & Cables, Ltd., and D. H. Black. October 24th, 1939. (535907.)

28600. "Visual course indicators for radio directive systems." Standard Telephones & Cables, Ltd., C. W. Earp and G. I. A. Bywaters. October 24th, 1939. (535908.)

28629. "Electric furnaces." British Thomson-Houston Co., Ltd. (J. Ferguson). October 25th, 1939. (535943.)

28706. "Luminescent screens." Marconi's Wireless Telegraph Co., Ltd. October 25th, 1938. (535947.)

29493. "Vapour electric arc convertors." General Electric Co., Ltd., and E. Gallizia. November 6th, 1939. (535862.)

30555. "Ignition systems for internal combustion engines." British Thomson-Houston Co., Ltd., and F. W. Carter. November 22nd, 1939. (535953.)

30587. "Tripping arrangements for operating mechanism of electric circuit-breakers." General Electric Co., Ltd., and F. J. Keeley. November 22nd, 1939. (535795.)

30920. "Wide frequency band amplifier systems." Marconi's Wireless Telegraph Co., Ltd. November 26th, 1938. (535834.)

31101. "Electron discharge devices." Marconi's Wireless Telegraph Co., Ltd. November 30th, 1938. (535866.)

31225. "Testing arrangements for fluid control valves." British Thomson-Houston Co., Ltd. December 1st, 1938. (535955.)

31496. "Dynamo-electric machines." English Electric Co., Ltd., E. A. Binney, W. T. Emery and J. Nichol. December 5th, 1939. (535798.)

31809. "Electric circuit-breakers having arc extinguishing arrangements." General Electric Co., Ltd., and C. J. O. Garrard. December 8th, 1939. (535799.)

32133. "Arc extinguishing arrangements for electric circuit breakers." General Electric Co., Ltd., P. H. Coales, C. J. O. Garrard and F. J. Keeley. December 13th, 1939. (535956.)

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405. "Gas- or vapour-filled electric discharge devices used in over-voltage protective arrangements." General Electric Co., Ltd., and B. N. Clack. January 8th, 1940. (535842.)

856. "Ship propulsion and other systems for the electric transmission of power." General Electric Co., Ltd., H. J. Coates and R. G. Jakeman. January 15th, 1940. (535959.)

1470. "Apparatus for maintaining bodies in suspension electromagnetically." British Thomson-Houston Co., Ltd. January 24th, 1939. (535871.)

1679. "Electric stoves." Pearl Industries Ltd., and T. Winston. January 27th, 1940. (535872.)

1787. "Radio altimeters." Marconi's Wireless Telegraph Co., Ltd. January 28th, 1939. (535961.)

2134. "Carriers for cartridge fuses." Cosway (Sales), Ltd., and G. P. Cosway. February 3rd, 1940. (535873.)

2552. "Manufacture of thermionic valves." M-O Valve Co., Ltd., and T. F. B. Hall. February 9th, 1940. (535878.)

3234. "Switch-frogs for the overhead conductors of electric traction systems." British Insulated Cables, Ltd., London Passenger Transport Board, T. C. Broom and H. J. Powell. February 21st, 1940. (Addition to 523167.) (535882.)

4587. "Commutators for dynamo-electric machines or other electrical apparatus." R. Bosch Gesellschaft. April 28th, 1939. (535915.)

4692. "Gyroscopic instruments." English Electric Company, Ltd., G. Tilstone and R. K. Whitehead. March 13th, 1940. (535966.)

7446. "Hydraulic control valves." British Thomson-Houston Co., Ltd. April 26th, 1939. (535922.)

7723. "Storage battery paste retaining envelopes." International Latex Processes, Ltd. May 13th, 1939. (535924.)

9003. "Telegraphones." Electrical Research Products, Inc. July 29th, 1939. (535927.)

FINANCIAL SECTION

Company News. Liquidations and Bankruptcies. Stock Exchange Activities.

Reports and Dividends

Johnson & Phillips, Ltd., held their annual meeting on May 15th when Mr. G. L. Wates (chairman), who presided, said that he did not propose to give a detailed account of the company's activities. The trading profit of £491,301 to a large extent resulted from the careful purchase of additional plant during many years past. Hitherto they had made certain payments only to men who volunteered for service with the Forces. As from January 1st, 1941, payments would be extended to all men in the Forces who had been employed by the company for two years prior to the war. The directors had decided to recognise the excellent work done by everyone in the company's employ by the payment of a special bonus to all those at present serving with the company.

The Llanelly and District Electric Supply Co., Ltd., is making an issue of 60,000 6 per cent. cumulative £1 preference and 60,000 £1 ordinary shares. In order to save double application forms and labour, shareholders have the right until May 30th to apply for shares in units composed of one preference and one ordinary share at the price of 43s. The issue is being made to meet capital requirements.

The Power Investment Corporation, Ltd., reports a profit for the year ended March 31st of £23,555, as compared with £30,816 for the preceding year. The preference dividends are met, but again no distribution is made on the ordinary capital. The balance carried forward is £35,454 (against £38,719 brought in).

Ransomes, Sims & Jefferies, Ltd., report that after providing for tax, the net profits for 1940 were £85,142, as compared with £75,436 for 1939. As reported in our last issue, the ordinary dividend for the year is maintained at 7½ per cent., reserve for post-war reconstruction and contingencies receives £35,000 and the balance carried forward is £55,723 (against £54,080 brought in).

Richard Johnson & Nephew, Ltd., report that the net profit decreased from £86,852 for 1939–40 to £47,895 for the year ended March 31st last. The ordinary dividend for the year is again 9 per cent. £10,000 is reserved for pensions, £10,000 placed to general reserve and £2,500 to reserve for holidays with pay. The balance carried forward is £38,786 (against £37,653 brought in).

The Rawlplug Co., Ltd., earned a net profit of £62,098 for 1940 (against £60,610). The final dividend is 30 per cent., again making 40 per cent. for the year. Reserve receives £5,325 (against £4,952) and £29,174 (£25,152) is carried forward. The directors state that the whole of the company's interest in the French subsidiary has been written off.

The London Electric Wire Co. & Smiths, Ltd., is paying a final dividend of 5½ per cent. for 1940, again making 7½ per cent. for the year.

The Marconi International Marine Communication Co., Ltd., has announced a final dividend of 5 per cent., making 7½ per cent. for 1940 (unchanged). The net profit for the year was £96,525.

The West Devon Electric Supply Co., Ltd., is paying an ordinary dividend of 5 per cent. (same).

Venner Time Switches, Ltd., are again paying no dividend on the ordinary shares.

New Companies

Princely Battery Co., Ltd.—Private company. Registered April 23rd. Capital £100. Objects: To carry on the business of manufacturers of, and dealers in, electric batteries, accumulators, acids and containers, dynamos, wireless sets, etc. Subscribers: C. W. Dickeson, 35, Wingate Road, Ilford, Essex, and L. C. Fisher, 35, Cross Street, Canford, Essex. Solicitors: Canter Hillyar and Co., 3–4, Lincoln's Inn Fields, W.C.2.

British Lion Battery Co., Ltd.—Private company. Registered April 23rd. Capital £100. Particulars same as above.

Locators, Ltd.—Private company. Registered May 3rd. Capital £1,000. Objects: To carry on the business of electrical and mechanical engineers, manufacturers of, and dealers in, articles used in the production, transmission and reception of sound, light and heat, etc. Directors: J. C. G. Gilbert, 7, Burdett Avenue, S.W.20, and three others. Registered office: 11, Queen Victoria Street, E.C. 4.

Derwent Electrical, Ltd.—Private company. Objects: To carry on the business of electrical, wireless and general engineers, consulting wireless experts, service agents, manufacturers of, and dealers in, batteries, accumulators and electrical apparatus and equipment, etc. Directors: G. L. Walton, 64, Hathaway Road, West Croydon, Surrey, and Mrs. M. Wyatt, 53, Epsom Road, Morden, Surrey.

Knox & Patton, Ltd.—Private company. Registered in Belfast May 1st. Capital £2,000. Objects: To carry on the business of wholesale and retail merchants for the sale of all kinds of electrical cleaners, polishers, refrigerators, washers, etc. Directors: Miss J. M. Knox, 1, Lynda Park, Jordanstown, and W. Patton, 26, Wellesley Avenue, Belfast, Registered office: 14, Wellington Place, Belfast.

Vallance Electrical, Ltd.—Private company. Registered May 10th. Capital £100. Objects: to carry on the business of manufacturers of and dealers in wireless and television sets and accessories, lighting apparatus, electrical fittings and appliances, etc. Subscribers: M. Laycock, 2, Ashgrove, Earlsheaton, Dewsbury, and C. M. Mellor, 59, Moorlands Road, Dewsbury.

B. P. L. (Instruments), Ltd.—Private company. Registered May 3rd. Capital £1,000. Objects: To carry on the business of manufacturers of, and dealers in, electrical, electronic, wireless and mechanical apparatus, devices, machinery and supplies, laboratory equipment, etc. Subscribers: M. L. Coates and S. J. Holdway, both of 69, Moorgate, E.C.2. Secretary: P. L. Coates. Solicitors: Stone and Stone, 69, Moorgate, E.C.2.

Quadrant Meter Co., Ltd.—Private company. Registered May 3rd. Capital £500. Objects: To carry on the business of manufacturers of, and dealers in, electrical and electronic measuring apparatus, ammeters, voltmeters and general electrical apparatus, etc. Subscribers: M. L. Coates and S. J. Holdway, both of 69, Newgate Street, E.C.2. Secretary: P. L. Coates. Solicitors: Stone & Stone, 69, Moorgate Street, E.C.2.

Companies' Returns

Statements of Capital

T. C. Gilbert & Co., Ltd.—Capital £5,000 in £1 shares. Return dated December 16th, 1940 (filed January 24th, 1941). 3,200 shares taken up. £2,300 paid. £900 considered as paid. Mortgages and charges: Nil.

Julius Sax & Co., Ltd.—Capital £10,000 in 3,000 7½ per cent. preference shares of £1 and 35,000 ordinary shares of 4s. Return dated January 6th, 1941. 2,650 preference and 18,000 ordinary shares taken up. £5,051 paid on 2,650 preference and 12,005 ordinary shares. £1,199 considered as paid on 5,595 ordinary shares. Mortgages and charges: Nil.

Gothic Electrical Supplies, Ltd.—Capital £50,000 in £1 shares. Return dated January 14th, 1941. 36,000 shares taken up. £5,400 paid. £30,600 considered as paid. Mortgages and charges: £14,500.

Wandleside Cable Works, Ltd.—Capital £35,000 in £1 shares. Return dated July 31st, 1940 (filed January 16th, 1941). 33,000 shares taken up. £33,000 paid. Mortgages and charges: Nil.

Hardman & Co., Ltd.—Capital £500 in 500 shares of £1 each. Return dated October 28th, 1940 (filed November 1st, 1940). 480 shares taken up. £480 paid. Mortgages and charges: Nil.

T. G. Brunskill, Ltd.—Capital £1,000 in £1 shares. Return dated February 12th, 1941. 701 shares taken up. £701 paid. Mortgages and charges: £250.

General Cable Manufacturing Co., Ltd.—Capital £150,000 in 150,000 preference shares of 10s. each and 300,000 ordinary shares of 5s. Return dated January 3rd, 1941. All shares taken up. £85,000 paid on 150,000 preference and 40,000 ordinary. £65,000 considered as paid on 260,000 ordinary. Mortgages and charges: Nil.

Nalder Bros. & Thompson, Ltd.—Capital £40,000 in 15,000 preference and 25,000 ordinary shares of £1. Return dated January 1st, 1941. 15,000 preference and 24,500 ordinary shares taken up. £14,064 paid. £25,436 considered as paid. Mortgages and charges: Nil.

Increases of Capital

A. Reyrolle & Co., Ltd.—The nominal capital has been increased by the addition of £250,000, in £1 shares, beyond the registered capital of £1,000,000. The directors are authorised to convert the new shares, when issued and fully paid up, into ordinary stock transferable only in units or multiples of £1.

W. & E. Kupfer, Ltd.—The nominal capital has been increased by the addition of £500 in £1 ordinary shares beyond the registered capital of £3,000.

Mortgages and Charges

Riley & Neate, Ltd.—Mortgage on moneys due in respect of goods supplied under a contract, dated April 15th, 1941, to secure all moneys due or to become due from the company to Barclay's Bank, Ltd.

Receiver Appointed

L. H. Farmiloe, Ltd.—C. Green, chartered accountant, 46, Singleton Road, Kersal, was appointed receiver and manager on May 1st, 1941, under powers contained in instrument dated October 21st, 1939.

Liquidations

Lesta, Ltd., electrical contractors, 156, Church Hill, Loughton, Essex.—A meeting of creditors was held recently at the offices of A. E. Attwood & Co., 90, Queen Street, Cheapside, London, E.C., when a statement of affairs was submitted showing liabilities of £1,354 and net assets of £340, leaving a deficiency, as regarded the creditors, of £1,014. The issued capital was £100, and so far as the shareholders were concerned there was a deficiency of £1,114, which was mainly accounted for by the losses on the trading and the writing down of the assets. A resolution was passed confirming the voluntary liquidation of the company, with Mr. A. E. Attwood as liquidator, with a committee of inspection.

Bankruptcies

A. Lawson, formerly A. Lotterman, electrical engineer, 261, Park West, Edgware Road, London, W.1.—Public examination May 30th at Bankruptcy Buildings, Carey Street, London, W.C.2.

A. J. Harding, electrical engineer, 50-51, Broad Street, Hereford.—Application for discharge to be heard on June 17th at the Shirehall, Hereford.

I. Harris, electrical contractor, 39, Normanby Road, Scunthorpe, lately residing and carrying on business at 40, Laneham Street, Scunthorpe.—Trustee, Mr. H. S. Bloomer, 8, Flottergate, Great Grimsby, Official Receiver, released May 12th.

T. P. Wood and **T. George,** electrical contractors, 28, Queen Street, Ipswich.—Second dividend of 1s. 4d. in the £, payable June 4th, at 13A, Great Colman Street, Ipswich.

STOCKS AND SHARES

TUESDAY EVENING.

LONDON'S War Weapons Week is hardly the time for Stock Exchange markets to be expected to develop any material degree of activity. Beforehand there was a little realisation of industrial stocks and shares on the part of holders anxious to utilise the proceeds in taking up Government war issues. These sales were, however, of sufficiently negligible amount to have no particular effect upon prices. The gilt-edged boomlet has given place to a demand for ordinary shares, and this served to neutralise any effect which might otherwise have been produced by sales made to raise money for National War Bonds, etc.

The Chancellor of the Exchequer has announced, in terms so vague and complex as to make them of no practical value to the ordinary person, that concessions are to be allowed to companies dealing with "wasting assets," more especially, of course, those connected with the mining and the oil industries. No changes have occurred in the prices of the purely gilt-edged stocks quoted in our lists.

Home Railway Firmness

Prices in the Home Railway market retain most of their recent strength, and investment continues to absorb such stock as comes on offer through the medium of executorships and of profit-taking. There has been little sign in this market of selling traceable to a desire to raise money for the purpose of employing it in war securities, and the market appears to be able to take, without reluctance, any stock that comes in. Prices show no quotable changes. London Passenger Transport "C" has barely budged from its present quotation of 31, for some six weeks. At this price the yield comes to £9 6s. per cent. on the money, assuming continuance of the 3 per cent. dividend last paid. Such a high return would probably attract money in the ordinary way, but at the present time, other junior Home Railway stocks stand at prices which, on current dividend payments, afford a yield running into double figures, and it is this consideration which restrains purchases of Transport "C." The Southern Railway stocks retain their previous good rises.

Wages Award

At the end of last week, the Railway Wages Tribunal published its award, giving a further war rise of 4s. a week to adult workers and an extra £10 a year to the salaried staff as from January 6th last. The estimated total annual cost is £12,400,000, but the Railway market in the Stock Exchange assumed that either the Government would subsidise the railways to this extent, or that permission would be given for a further raising of fares to meet the extra cost. In consequence, prices of the stocks were not affected. The men had asked for about £28 million extra wages: as the Tribunal has awarded "only" about £12½ million, this is hazily regarded as a bull point for the companies.

Investment's Appetite

With income tax at 10s. in the £, it is a matter of surprise to Stock Exchange members to find how readily investment will take securities from which the yield is comparatively modest. Reference to our weekly price-lists will indicate the appetite that exists for preference shares, however slender the yield, while as for debenture stocks, the famine in them has been constantly mentioned. With regard to the latter, it may be of interest to say that a small amount of City of London 5 per cent. debenture stock has been available at 115, giving a return of £4 2s. 6d. per cent., but without allowing for repayment at 100 in 1971. About £1,000 Edmundson's 4 per cent. debenture was also on offer at 105, the yield being £3 7s. 0d. per cent. The issue is dated 1950–80; the repayment price is 100.

Preference Shares on Offer

Most of the electricity supply companies' preference shares show a return that ranges from £3 17s. 0d. on County of London "fours," to 4½ per cent. obtainable from Mersey Power 6 per cents. at 28s. Scottish Power "sixes," Shropshire "sixes" and Mid-Cheshire "fours," return an average of barely £3 18s. 0d. per cent. Amongst the equipment and manufacturing group, the following five lots of preference shares were on offer, at the prices quoted, at the time this was being written :—

Amount	Preference Share	Div. %	Price s. d.	Int. Date	Yield £ s. d.
200	Brit. Elec. Transformer	5	22 9	J.D.	4 7 11
250	B.T.H.	7	32 6	J.D.	4 6 2
120	Elec. Construction ..	7	28 9	M.N.	4 17 6
250	Electrical Switchgear ..	5	18 9	J.D.	5 6 8
500	G.E.C. "B" ..	7½	36 6	J.D.	4 2 2

The dividend in each of these cases is cumulative.

Johnson & Phillips

At the Johnson & Phillips meeting last week, the chairman observed that the 100 per cent. E.P.T. was a grievous burden but that the pill was somewhat sweetened by the promise of a return of 20 per cent. of the net amount paid over the period. "We are naturally grateful," said he, "even for small crumbs from the Chancellor's table in these hard times. The money will be extremely valuable to us, as to other manufacturers, for the reconditioning after the war of our plant and equipment." No credit has been taken in the Johnson & Phillips figures for what return may be coming to the company after the war. It is to remain an unstated reserve, to be brought into the accounts as and when it materialises. The price of the shares remains at 42s. 6d., at which the yield is £7 1s. 2d. per cent.

Ever Ready

Ever Ready shares are firmer at 26s. 6d., ex the dividend of 25 per cent., equal to 7½d. per share, deducted on May 12th. The annual meeting is to be held on June 4th. Satisfaction is felt at the maintenance of the 40 per cent. dividend for the year, which had been generally anticipated. Some surprise was expressed, however, at the statement in the report that the increase in production and sales was less than planned, although the margins on the increase were sufficient to absorb the higher costs of production. After making allowance for taxation, directors' fees, etc., the distributable balance is £621,440; that is, £10,600 less than the corresponding figure of a year ago. The carry forward is increased from £72,500 to £101,400. At the present price, the yield on the basis of a 40 per cent. dividend is £7 11s. 0d. per cent.

Miscellaneous Matters

Cable and Wireless 5 per cent. preference stock has again reached three figures, and the ordinary is 10s. up at 63½. Globe Telegraph and Trust ordinary at 27s. 6d. are 1/16 lower, bringing the price into line with that of the preference shares. The dividend on the ordinary has been paid hitherto free of tax; that on the preference is, of course, distributed less 10s. in the £. Anglo-American Telegraph preferred has risen to 103½, though the deferred stock shows a point fall at 22½. Changes in the electricity supply issues are few and far between. Cawnpore Electrics strengthened to 28s. 9d.

In the Home group, the changes call for no special comment. The Babcock & Wilcox dividend brought in buyers; the price is now £2 ex dividend. General Electric ordinary are a good market with a rise to 81s. 3d., on the anticipation of the company paying again 20 per cent. for the year. The announcement is due next month. Murex hardened to 4⅛. Tube Investments, at 89s. 6d. ex dividend, show a small improvement, allowing for the deduction. Westinghouse Brake strengthened to 40s. 9d., though Consolidated Signal shares, which usually move with Westinghouse Brakes, are still dull at 3⅛. Marconi Marines at 22s. 6d. are unaffected by the repetition of the previous dividend rate of 7½ per cent.

Directors' Fees

It was announced last week in the House of Commons that the annual salary paid to the chairman of the London Passenger Transport Board, Lord Ashfield, is £12,500, the same as it was eight years ago. The vice-chairman, Mr. John Cliff, receives £3,000 and the four part-time members of the Board get £750 per annum. Mr. Frank Pick, whose appointment expired a year ago, received £10,000 per annum. Lord Ashfield is a director of five companies, including the Midland Bank, the Northmet Power Co., and the North Metropolitan Power Station Co.

According to the report of the Ever Ready Co. for the year ended March 31st last, the directors' remuneration and share of profits came to £28,258. The board consists of five directors, Mr. Magnus Goodfellow being chairman and managing director.

Demand for Reform

Beyond the narrowing of the price of British Electric Traction deferred stock to the extent of 50 points, the Stock Exchange Official List so far shows no alteration in response to the renewed demand for amendment of quotations, in order to bring them into closer correspondence with actual dealing prices. In the market for Home electricity companies' shares, the margins officially quoted are mostly half-a-crown. That is to say, Metropolitan Electric ordinary shares are quoted at 30s. to 32s. 6d.; North Easterns at 26s. 3d. to 28s. 9d.; City of London at 20s. to 22s. 6d.; and so on. Actually when a broker comes to deal for a client, the jobber will make a shilling or an eighteen-pence price. Without knowing what the broker wishes to do, whether to buy or sell, the jobber will quote a double price, at which he is prepared to do business, and this double price is, as just mentioned, bounded by a margin of 1s. or 1s. 6d. There is no reason why the official price should be quoted at half-a-crown difference.

The same state of affairs prevails in the shares of the manufacturing and equipment group. Johnson & Phillips, as an example, are officially quoted at 40s. to 45s., British Insulated also at a 5s. margin, 80s. to 85s. For dealing purposes, there are much closer prices. Every allowance has to be made for difficulties of doing bargains when the Stock Exchange deals, as now, on a cash basis, but today's official margins are unduly wide—to the point, indeed, of being misleading.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1941 Highest	1941 Lowest	Dividend Previous	Dividend Last	Middle Price May 20	Rise or Fall	Yield £ s. d.
Home Electricity Companies							
Bournemouth and Poole	48/6	45/–	15	12½	46/3	..	5 8 3
British Power and Light	27/9	23/–	7	6	24/6	..	4 18 0
City of London	22/6	20/–	7½	7	21/3	..	6 11 9
Clyde Valley	36/6	33/6	8	8	35/–	..	4 11 5
County of London	34/6	30/–	10½	8	30/–	..	5 6 8
Edmundson's:							
7% Pref.	31/–	25/6	7	7	30/9	+9d.	4 11 1
Ord.	25/6	23/6	6	6	25/6	..	4 14 0
Elec. Dis. Yorkshire	39/–	36/–	9	9	38/9	..	4 12 9
Elec. Fin. and Securities	40/–	39/–	12½	12½	40/–	..	6 5 0
Elec. Supply Corporation	37/9	36/–	11½	10	37/6	..	5 6 8
Isle of Thanet	8/–	6/–	2	Nil	7/–	..	—
Lancs Light and Power	31/6	28/6	7½	7½	31/3	..	4 16 0
Llanelly Elec.	21/–	19/6	5½	5½	20/–	..	5 10 0
Lond. Assoc. Electric	16/6	12/6	5½	4½	15/9	..	5 14 3
London Electric	23/6	21/3	7	7	22/6	..	6 4 5
London Power Deb. Red.	105½	102	5	5	103	..	4 17 1
Metropolitan	34/6	31/–	10	8	31/3	..	5 2 3
Midland Counties	35/6	32/9	8	8	35/–	..	4 11 5
Mid. Elec. Power	35/–	33/3	9	9	35/–	..	5 2 10
Newcastle Elec.	26/3	24/6	7	7	25/–	..	5 12 0
North Eastern Elec.:							
Ordinary	29/–	25/6	7	7	27/6	..	5 1 10
7% Pref.	32/6	29/–	7	7	32/6	..	4 6 2
Northampton	2½	39/6	10	10	41/3	..	4 17 0
Notting Hill 6% Pref. (£10)	9	8	6	6	8½	..	—
Northmet Power:							
Ordinary	34/6	28/6	10	7	28/9	..	4 17 4
6% Pref.	29/6	27/3	6	6	29/6	+6d.	4 1 4
Richmond Elec.	20/–	18/–	6	6	18/9	..	6 8 0
Scottish Power	36/6	33/–	8	8	36/3	..	4 8 5
Southern Areas	16/6	14/6	5	5	16/3	..	6 3 0
South London	20/–	19/3	7	7	20/–	..	7 0 0
West Devon	21/6	20/9	5	5	21/3xd.	+6d.	4 14 1
West Glos.	18/3	17/3	4½	4½	17/6	..	5 2 10
Yorkshire Elec.	38/3	34/6	8	8	38/3	..	4 4 0
Overseas Electricity Companies							
Atlas Elec.	2/6	1/6	Nil	Nil	2/–	..	—
Calcutta Elec.	37/3	33/–	8*	7*	36/–xd	..	3 17 8
Cawnpore Elec.	30/–	26/–	10	10	28/9	..	7 5 9
East African Power	25/6	21/6	7	7	25/–	..	5 12 0
Jerusalem Elec.	22/6	19/3	7	7	20/–	..	7 0 0
Kalgoorlie (10/–)	12/6	11/–	7½	7½	12/6	..	6 0 0
Madras Elec.	25/3	23/6	8*	6*	23/9	..	—
Montreal Power	31	24	1½	1½	25	..	6 0 0
Palestine Elec. "A"	20/6	16/–	Nil	Nil	16/3	..	—
Perak Hydro-electric	18/3	16/3	2½	6	17/6	..	6 17 2
Shawinigan Power	18½	15	83cts.	90cts.	15	..	—
Tokyo Elec. 6%	40½	36	6	6	37½	..	16 0 0
Victoria Falls Power	76/6	69/6	15	15	73/9	..	4 1 4
Whitehall Investment Pref.	14/9	8/3	7½	7½	8/9	..	9 17 3
Public Boards							
Central Electricity:							
1950–70	110½	108	5	5	110½	..	4 10 6
1955–75	113½	109½	5	5	113	..	4 8 6
1951–73	108	105½	4½	4½	108	..	4 3 4
1963–93	101	94	3½	3½	100	..	3 10 0
1974–94	93	87½	3½	3½	93	..	3 10 0
London Elec. Trans. Ltd.	94	91½	2½	2½	94	..	2 13 2
London & Home Counties							
1955–75	108	106	4½	4½	108	..	4 3 4
Lond. Passenger Transport:							
A	120	109	4½	4½	119½	..	3 15 4
B	114	102½	5	5	112½	..	4 9 0
C	36	29	1½	3	31	..	9 13 6
West Midlands Joint Elec.							
1948–68	108	103	5	5	107½	..	4 13 0
Telegraph and Telephone							
Anglo-Am. Tel.:							
Pref.	103½	99	6	6	103½	+½	5 16 1
Def.	24	21	1½	1½	23½	−1	6 13 4
Anglo-Portuguese	17/6	12/6	8	8	12/6	..	12 16 0
Cable & Wireless:							
5½% Pref.	102	93	4½	5½	100	+1	5 10 0
Ord.	63	52½	4	4	63½	+½	6 6 0
Canadian Marconi $1	5/–	4/–	Nil	4cts.	5/–	..	3 4 0
Globe Tel. & Tel.:							
Ord.	29/–	26/–	7½*	6*	27/6	−½	4 7 3
Pref.	27/6	25/–	6	6	27/6	..	4 7 3
Great Northern Tel. (£10)	14	10½	20	20	12½	..	—
Inter. Tel. & Tel.	3½	2½	Nil	Nil	3	..	—
Marconi-Marine	23/–	19/9	7½	7½	22/6	..	6 13 2
Oriental Telephone Ord.	55/6	47/–	12*	11½*	2½	..	4 3 8
Telephone Props.	11/6	11/–	6	6	11/3	..	10 13 4
Telephone Rentals (5/–)	7/9	6/9	10	10	7/3	..	6 18 0

Company	1941 Highest	1941 Lowest	Dividend Previous	Dividend Last	Middle Price May 20	Rise or Fall	Yield £ s. d.
Traction and Transport							
Anglo. Arg. Trams:							
First Pref. (£5)	2/3	1/–	Nil	Nil	2/–	..	—
4% Inc.	8½	4	Nil	Nil	4½	..	—
British Electric Traction:							
Def. Ord.	830	740	45	45	750xd.	+15	6 0 0
Pref. Ord.	167	150	8	8	156xd.	..	5 2 7
Bristol Trams	40/–	36/–	8*	8	36/3	..	4 8 5
Brazil Traction	8	6½	$1	50c.	7	+½	—
Calcutta Trams	19/9	18/6	8	5½	19/–	..	5 17 8
Cape Elec. Trams	17/6	16/6	5	5	17/–	..	5 17 4
Lancs Transport	39/9	36/–	10	10	38/9	..	5 3 1
Mexican Light:							
1st Bonds	40	34½	5	5	40	..	—
Rio 5% Bonds	85½	82½	5	5	85	..	5 17 8
Southern Rly.:							
5% Prefd.	53½	43½	5	5	50½	..	9 18 0
5% Pref.	94	77½	5	5	93½	..	5 7 0
T. Tilling	43/6	34/6	10	10	42/6	..	4 14 0
Tilling & B.A.	48/–	45/6	8*	7*	45/9	..	3 1 2
West Riding	36/–	34/–	10	10	36/–	..	5 11 1
Equipment and Manufacturing							
Aron Electricity Ord.	18/6	16/–	15	Nil	17/6	−6d.	—
Assoc. Elec.:							
Ord.	41/–	38/3	10	10	40/–	..	5 0 0
Pref.	36/–	33/3	8	8	35/–	..	4 11 5
Automatic Telephone & El.	47/3	32/–	12½	12½	41/3	..	6 1 1
Babcock & Wilcox	43/3	39/–	10	11	40/–xd.	+6d.	5 10 0
British Aluminium	43/6	39/–	12½	10	40/–	..	5 0 0
British Insulated Ord.	88/3	78/9	20	20	82/6	..	4 17 0
British Thermostat (5/–)	12/3	10/6	18½	18½	12/–	..	7 14 2
British Vacuum Cleaner (5/–)	6/3	6/–	40	12½	6/3	..	10 0 0
Brush Ord.	4/3	3/6	Nil	Nil	4/–	..	—
Callender's	65/6	58/6	15	15	61/3	..	4 17 9
Chloride Elec. Storage	63/6	60/–	15	15	62/6	..	4 15 10
Consolidated Signal	65/–	60/–	17	17	62/6	..	5 8 7
Crabtree (10/–)	23/9	21/3	17½	17½	22/6	..	7 15 7
Crompton Parkinson:							
Ord. (5/–)	19/–	17/9	30	20	18/9	..	5 6 8
E. K. Cole (5/–)	4/9	2/9	10	Nil	4/6	..	—
Elec. & Musical Industries							
(10/–)	8/6	7/3	5	Nil	7/6	..	—
Electric Construction	27/6	25/–	13½	10	27/6	..	7 5 6
Enfield Cable Ord.	51/–	45/–	16½	12½	45/–	..	5 11 3
Electrical Switchgear (10/–)	22/6	20/–	16	10	20/–	..	5 0 0
English Electric	31/6	29/–	10	10	31/3	..	6 8 0
Ensign Lamps (5/–)	16/3	15/–	25	25	15/–	..	8 6 3
Ericsson Tel. (5/–)	37/3	35/–	25*	22*	35/–	..	3 2 10
Ever Ready (5/–)	27/6	25/–	40	40	26/6xd.	+1/–	7 11 0
Falk Stadelmann	16/9	13/9	6	7	15/9	..	8 17 10
Ferranti Pref.	25/6	23/6	7	7	25/–	..	5 12 0
G.E.C.:							
Pref.	33/–	30/6	6½	6½	32/6	..	4 0 0
Ord.	81/–	77/–	20	20	81/3	+½	4 18 4
Greenwood & Batley	21/–	18/6	15	13	20/–	..	13 0 0
Hall Telephone (10/–)	13/–	10/–	15	10	12/6	..	8 0 0
Henley's (5/–)	21/6	19/6	20	20	20/–	..	5 0 0
4½% Pref.	21/6	20/–	4½	4½	21/3	..	4 4 8
Hopkinsons	41/6	37/6	15	15	41/3	..	7 5 4
India-Rubber Pref.	21/6	19/6	5½	5½	21/3	..	5 3 6
Intl. Combustion	92/6	81/3	32½	30	92/6	..	6 13 4
J. Lucas	58/–	50/6	15	15	57/6	..	5 4 4
Johnson & Phillips	48/3	43/–	15	15	42/6xd.	..	7 1 2
Lancashire Dynamo	53/6	50/–	20	20	52/6	..	7 12 5
Laurence, Scott (5/–)	10/–	7/6	15	15	9/6	..	7 17 10
London Elec. Wire	25/6	20/–	7½	7½	22/6	..	6 13 4
Mather & Platt	37/9	32/–	13½	10	38/9	+½	5 3 3
Metropolitan Elec. Cable Pf.	22/–	21/3	5½	5½	21/3	..	5 3 6
Murex	84/6	75/–	20	20	82/6	+½	4 7 0
Pye Deferred (5/–)	11/6	10/9	25	25	11/3	..	11 2 2
Revo (10/–)	21/3	18/9	17½	5	21/3	+6d	2 7 0
Reyrolle	52/6	47/9	12½	12½	51/3	..	4 17 6
Siemens Ord.	20/9	17/–	7½	7½	19/6	−6d.	7 13 10
Strand Elec. (5/–)	2/–	1/–	4	2	2/–	..	5 0 0
S. Smith (1/–)	7/9	5/9	37½	50	6/3	..	8 0 0
Switchgear & Cowans (5/–)	9/–	7/3	10	15	8/9	..	8 11 6
Telegraph Condenser (10/–)	12/6	7/–	Nil	5	12/6	..	4 0 0
Telegraph Construction	39/–	34/6	10	10	40/–	..	5 0 0
Telephone Mfg. (5/–)	7/6	6/9	9	9	7/3	..	6 4 2
Tube Investments	92/6	89/–	23½	23½	89/–xd.	+6d.	5 5 9
Vactric (5/–)	2/3	2/–	4	Nil	2/–	−3d.	—
Vickers (10/–)	16/–	14/–	10	10	15/–	..	6 13 4
Ward & Goldstone (5/–)	19/9	12/6	20	20	16/6	..	5 19 9
Westinghouse Brake	42/6	39/6	17½	10	40/9	+½	4 18 1
Walsall Conduits (4/–)	26/6	24/6	55	55	26/3	..	8 7 6
West, Allen (5/–)	4/3	3/6	7½	7½	3/9	..	10 0 0

* Dividends are paid free of Income Tax.

CONTRACT INFORMATION

Tenders Invited and Accepted. Schemes Promising Electrical Work.

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parenthesis.

Holmfirth.—May 31st. Electricity Department. Supply and delivery of one 200-kVA transformer. (See this issue.)

Newcastle-on-Tyne.—May 24th. Health Committee. One motor-driven counter-weighted Bucky table, and one four-valve diagnostic X-ray unit. Specification and form of tender from the Medical Officer of Health, Health Department, Town Hall.

City Council. X-ray equipment for the Shotley Bridge Emergency Hospital. Plans by the City Medical Officer of Health. Town Hall.

New Mills.—June 2nd. Electricity Department. 10-kV cables. (May 16th.

Salford.—June 2nd. Electricity Department. Twelve-panel switchboard for 400-V, 15,000-kVA service. (May 16th).

South Africa.—DURBAN.—City Council. June 20th. Lightning arrestors, pole fuses, l.v. insulators, enamelled shades and sodium vapour lamps. Battery charging plant and electrical test bench.

July 4th. Five 15-kVA transformers.

June 6th. 33 kV 3-phase air-break switches and equipment. (Contract E.2025.)

JOHANNESBURG.—City Council. June 7th. Electric lighting fittings for Art Gallery. Low-voltage insulators.

PORT ELIZABETH.—City Council. July 24th. Cable, copper wire and house service cut-outs.

Walsall.—June 5th. Electric Supply Department. Three 500-kVA transformers. (May 16th.)

West Midlands.—May 28th. Joint Electricity Authority (Shropshire Distribution Area). Two 7,500-kVA and two 2,000-kVA transformers. (May 2nd.)

May 30th. 12,000-kVA transformer. (May 9th.)

June 4th. Supply, delivery, erection, laying and testing of 33,000 V overhead steel tower transmission line and 33,000 V, 6,600 V and 400 V underground cable in connection with the Wolverhampton—Cannock—Chasetown power transmission line. (May 16th.)

Orders Placed

Barrow-in-Furness.—Electricity Committee. Accepted. Switchgear at Ulverston substation (£2,169) and Dalton substation (£529). —Metropolitan-Vickers Electrical Co.

Darlington.—Electricity Committee. Accepted. Distribution switchgear (£4,479).—A. Reyrolle & Co.

Glasgow.—Transport Committee. Accepted Cable (£8,032).—Scottish Cables.

Gloucester.—Electricity Committee. Accepted. Overhead lines (£900).—Callender's Cable & Construction Co.

Grimsby.—Electricity Committee. Accepted. Switchgear (£574).—A. Reyrolle & Co. Cables (£207).—Scottish Cables, Ltd. Transformer (£247).—Brush Electrical Engineering Co. Turbine parts (£509).—Metropolitan-Vickers Electrical Co.

Hampshire.—Health Committee. Accepted. Installation of fire alarm system at Coldeast Mental Colony (£132).—Automatic Telephone and Electric Co.

Heston and Isleworth.—Electricity Committee. Accepted. Tubes, flanges, etc. (£285). —Stewarts & Lloyds. Turbo-alternator repairs (£1,950).—Brush Electrical Engineering Co. Switches (£647).—Switchgear and Equipment. Three 600-kVA transformers (£742 each).—Transformers & Welders.

India.—Amongst contracts recently placed by the Indian Stores Department are the following :—Cells (Rs. 59,610) and two sets of Chloride plant with accessories (Rs. 14,024). —Chloride Electrical Storage Co. (India). Two arc welding sets (Rs. 4,332).—Associated Electrical Industries (India). Electrically operated hospital bed lift (Rs. 15,771).—F. & C. Osler, New Delhi.

London. — ISLINGTON. — Libraries Committee. Accepted. Repairing electrical installation at central library (about £100).—Sandilands.

BETHNAL GREEN. — Borough Council. Accepted. Conversion of automatic control signals into vehicle-actuated system, Cambridge Heath Road-Roman Road (£667). —Siemens & General Electric Railway Signal Co.

Stourport.—Finance Committee. Recommended. Electric wiring of the Town Hall (£521).—T. Vale & Sons, Ltd.

Swindon.—Electricity Committee. Accepted. Ash handling plant (£7,315) and soot disposal plant (£2,000).—John Thompson Water Tube Boilers. Cables for twelve months.—Standard Telephones & Cables.

Wolverhampton. — Water Committee. Accepted. 60-HP electric borehole pump (£900). —James Beresford & Son.

Worcestershire.—Police Committee. Accepted. Electric lamps for police stations (£42).—John Dyer & Sons.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Barking.—Depot (£6,000), St. Paul's Road, for B.C. ; borough engineer, Town Hall.

Blackpool.—Hutments, Isolation Hospital ; borough engineer.

Carlow.—Houses (243), Pollerton Road ; G. C. McIntyre, town clerk, Town Hall.

Carlton (Notts.).—Two pumps, Wey Bridge Clough and Dam Dyke Clough (£9,000) for Lower Aire Drainage Board.

Cheltenham.—Feeding centre, Whaddon Road ; borough engineer.

Cockermouth.—Additions to premises for the U.D.C. ; surveyor.

Consett.—Completion of partially built houses at Delves Lane, for U.D.C. ; T. P. Leath, surveyor, Blackhill, Co. Durham.

Cumberland.—Conversion of Keswick casual wards as children's nursery, with equipment, for County P.A.C. ; J. H. Haughan, county architect, Alfred Street North, Carlisle.

Dartford.—Rebuilding at Hospital, for District Guardians' Committee.

Grantham.—Alterations at 74-76, Westgate; Traylen and Lenton, architects, 16, Finkin Street.

Ilkeston. — Feeding centres (£1,100); borough engineer.

Lanesborough.—Houses (20), for Longford Board of Health ; R. B. Higgins, engineer.

Llangain. — Alterations at Coomb, for National Children's Home, Highbury Park, London, N.5 ; W. S. P. Cottrell, 8, Quay Street, Carmarthen.

Maghull.—Pump house at sewage works for Alt Drainage Board ; R. W. Eaton, county land drainage engineer, Central Buildings, North John Street, Liverpool.

Manchester.—Alterations to "C" Block, Park House, Hospital, Crumpsall, for Health Committee (£1,800); G. Noel Hill, city architect, Town Hall.

Remand Home, Brookfield, Cheadle, for T.C. ; G. Noel Hill, city architect.

Martley.—Houses (10); R.D.C. surveyor.

Newcastle (Staffs.).—Day nurseries for E.C.; A. Cotton, borough surveyor, Municipal Buildings.

Newtown.—Adaptation and equipment at school canteen, for Montgomeryshire E.C.; county architect, County Offices, Welshpool.

Old Trafford.—Traffic and parcels office, Chester Road, for Manchester Transport Committee; R. S. Pilcher, general manager, Transport Offices, Piccadilly, Manchester.

Pontefract.—Additional wing to General Hospital for the Board of Management; Jackson Morris (chairman).

Preston.—Community feeding and school canteens at Kearsley, Huyton, Tyldesley, Denton, etc., for Lancashire C.C.; S. Wilkinson, county architect, County Offices.

Pwllheli.—Communal feeding and cooking centre at the Central School for T.C.; C. Roberts, borough surveyor, Town Hall.

Rotherham.—Feeding centres (£12,600); borough engineer.

Day Nurseries for T.C.; borough engineer.

Rothwell (Yorks.).—Community feeding and cooking centre for the U.D.C.; F. Hartley, architect, Council Offices.

Sheffield.—Re-building the "Royal Oak" public house, King Street; John Richdale & Co., Britannia Brewery.

Alterations to Wostenholm Hall, Queen Street for police purposes for Watch Committee; city architect.

Motor repair workshop for the L.M.S. Railway; A. K. Wallace, chief engineer, Euston, London, N.W.1.

Stoke-on-Trent.—Police station at Birches Head for Watch Committee; J. R. Piggott, chief architect, Town Hall.

Stourport-on-Severn. — Additions junior school (£1,579); T. Vale & Sons, Ltd.

Stretford.—Decontamination centre, Ayres Road; Eastnor Electrical Co.

Baling press house; Rubber Regenerating Co., Ltd.

Sawmill; G. Mason & Co., Ltd.

Wakefield.—Feeding centres (£5,090); city engineer.

Apparatus and equipment for workshops at Technical College (£2,609), for T.C.; S. G. Wardley, citv architect, Town Hall.

Walsall.—Parish Hall, Delves Estate for St. Gabriel's Church; Rev. A. Fraser, The Vicarage, St. Gabriel's, Fullbrook.

Warrington.—Dining rooms and lavatories at works at School Brow and at works at Dalton Bank; Rylands Bros., Ltd., Church Street.

Operating theatre and X-Ray unit at Hefferston Grange Emergency Hospital; H.M. Ministry of Works, Whitehall, S.W.1.

Extensions to Infirmary and Dispensary, Bank Quay (£15,000); J. H. Smethurst, chairman, Board of Management, Warrington Infirmary and Dispensary.

Pump house, for T C.; N. T. Smith, borough electrical engineer.

Warwickshire.—Shelters and A.R.P. premises (£25,000); county architect.

West Hartlepool.—Flats, Grindon Lane and West View, for Sutton Dwellings Trust, Sunderland; C. S. Errington, architect, 46, Grainger Street, Newcastle-on-Tyne.

Iron and Steel Control

THE Ministry of Supply has issued a Direction (Direction No. 3) under the Control of Iron and Steel (No. 8) Order, 1940, dealing with iron castings. Under paragraph 1 of the Direction, maximum prices for what is usually known as builders' ironwork, are increased to 21 per cent. above the basis prices in the deposited schedules; an increase of 2½ per cent. on those basis prices as compared with the prices previously ruling. This increase is based on increases in the cost of wages and fuel. Paragraph 2 of the Direction restricts to half a hundredweight, or £10 in value, the maximum quantity of iron castings which any person may buy without licence in any week. The previous limit was 5 hundredweights, or £10, and this further restriction arises from the necessity of conserving supplies of iron. Copies of the above mentioned Direction may be obtained from H.M. Stationery Office, York House, Kingsway, W.C.2, or through any bookseller, price 1d.